AD693258

AD

MISCELLANEOUS PUBLICATION 30

ASSESSMENT OF RISK OF HUMAN INFECTION IN THE MICROBIOLOGICAL LABORATORY

SECOND EDITION

Arnold G. Wedum
Richard H. Kruse

JULY 1969

SEP 26 1969

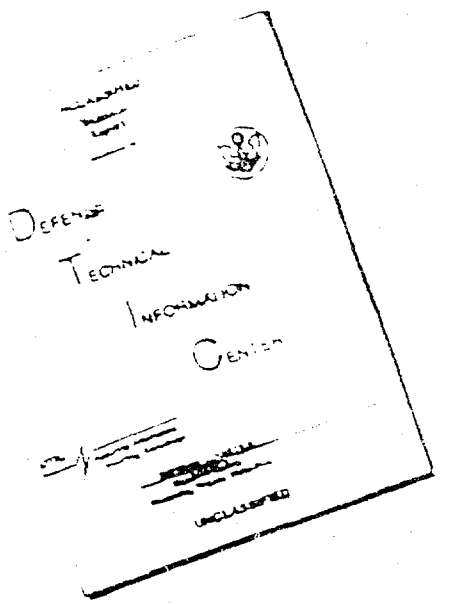
DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

This document has been approved for public release and sale; its distribution is unlimited.

Reproduced by the
CLEARINGHOUSE
for Federal Scientific & Technical
Information Springfield Va. 22151

88

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

REPRODUCED FROM
BEST AVAILABLE COPY

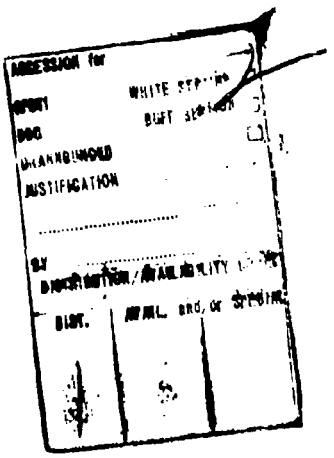
DDC AVAILABILITY NOTICE

Distribution of this publication is unlimited; it has been cleared for release to the general public. Non-DOD agencies may purchase this publication from Clearinghouse, ATTN: Storage and Dissemination Section, Springfield, Virginia, 22151.

DISPOSITION INSTRUCTIONS

Destroy this publication when it is no longer needed. Do not return it to the originator.

The findings in this publication are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.



DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland 21701

MISCELLANEOUS PUBLICATION 30

ASSESSMENT OF RISK OF HUMAN INFECTION IN THE MICROBIOLOGICAL LABORATORY

Second Edition

Arnold G. Wedum

Richard H. Kruse

July 1969

Research and Radiological Division
INDUSTRIAL HEALTH AND SAFETY DIRECTORATE

FOREWORD

This edition supersedes the first edition, Miscellaneous Publication 19, published November 1966. All material in the first edition is included here. Accordingly, the first edition has been recalled.

ACKNOWLEDGMENTS

The authors express their appreciation to the staff members of the following libraries, whose assistance made possible the literature survey for Tables 3 and 4: Technical Library and Walter Reed Army Medical Unit, Fort Detrick; National Library of Medicine and National Institutes of Health, Bethesda, Maryland; and Department of Agriculture, Washington, D.C. Special thanks are due Mrs. Cathryn F. Eaves, Fort Detrick Technical Library, for locating journals and translations, and Mr. Joseph Forrest, National Library of Medicine, for locating innumerable "hard-to-find" foreign journals and double-checking problem references.

We are grateful to the many interested scientists who contributed their unpublished data for Table 4.

Lastly, we are indebted to the personnel of Industrial Health and Safety Directorate for their aid, especially Russell A. Thomas, who rendered valuable assistance in the animal experiments. The highly competent secretarial help of Mrs. Shirley T. Jewell was invaluable in the compilation of this work.

ABSTRACT

In estimating the risk of human infection during research in the microbiological laboratory and in deciding upon appropriate safeguards, it is useful to know the nature of the work in terms of (i) potential accidental microbial aerosol formation and accidental injection, ingestion, cut, and bite; (ii) the number of recorded laboratory infections and their outcome; (iii) the medical prophylactic procedures available; (iv) whether the microorganism is excreted in urine and feces; and (v) whether inoculated animals infect normal cagemate control animals. Detailed tabular summaries with 700 references and working assumptions pertinent to these matters are presented for 162 causative agents or diseases.

CONTENTS

I. INTRODUCTION

Microbiological safety measures to reduce occupational infection of laboratory personnel have been receiving increased attention.[1,2,4,5,16] A major problem lies in deciding what is important in laboratory design,[11,18] equipment, and precautionary technique.[17] Inevitably there are inconsistencies; one important reason is that the precipitating act, source, or means of infection of personnel is unknown in 80 to 84% of laboratory-acquired illnesses.

This publication presents information that will aid in assessing the risk to the experimenter, to the experiment, and to the public that may accompany research on diseases infectious for man, or that may arise during handling, care, and public transportation of infected animals. The Appendix provides much of this information in tabular form with associated citations to the literature. It is as much a purpose of this publication to discourage excessive precautions as it is to encourage caution when knowledgeable evaluation shows a need for protection.

Long experience has provided an answer one way or another in many instances. Yet, with the emerging etiology of various old diseases of man and studies of newly recognized entities, there are now few responsible persons who are willing to await the verdict of time, with its possible repetition of the illnesses and deaths that marked earlier investigations in microbiology. Certainly no one wants to be responsible for a series of illnesses involving those diseases with a long incubation period. One example is the special virus-leukemia program of the National Cancer Institute, which is based upon the assumption that at least one virus is an indispensable element in human leukemia or lymphoma. In this program, concentration of actual or potential causative agents into very small volumes has now been achieved, and cross-species experimental transfer appears imminently possible among chickens, mice, and monkeys.

This report primarily concerns microbial diseases of man. Undoubtedly many references have been missed in compiling Tables 3 and 4. In some instances there are so many reports, such as those for the successful recovery of enteroviruses from human feces, that only the first few references that came to hand are mentioned, without any attempt to recognize priority of publication. Our limited experience in the veterinary field has allowed only incomplete coverage there, but it is sufficient to assist in judging the risk of human infection. In the field of cancer and leukemia, inclusion of the few reports available is intended to stimulate the interest of investigators in providing more information, so that the need for precautionary practices can be better evaluated. Additions and corrections will be welcomed.

II. LABORATORY-ACQUIRED HUMAN INFECTION AS AN INDICATOR OF RISK

A. NUMBER OF INFECTIONS

Table 1 lists 2,912 laboratory-acquired human infections that have been reported in various summaries. Of course, there are many unreported cases, especially among those characterized by a mild illness or by a subclinical infection recognizable only by a serologic change. Not included are many cases among veterinarians infected while handling naturally infected animals and among nurses and physicians in contact with patients. Sometimes it is difficult to decide whether such an illness should be considered laboratory-acquired or not.

A judicious examination of Table 1 requires consideration of how long the disease has been under laboratory study, how many persons have been in laboratory contact, the effectiveness of vaccination, and the extent to which laboratory infections have been recognized and reported.

B. INFECTIOUS HUMAN DOSE

It is not always fully realized that only a small number of appropriate microorganisms are required to induce illness in man. Table 2 summarizes various published data. The indicated human infectious dose produced clinical disease in 50% or more of the volunteers. For such highly infectious microorganisms as Pasteurella tularensis or Coxiella burneti, ten microbial units are enough to infect most unimmunized men.

The data in Table 2, and many years' experience in reviewing laboratory-acquired human illness in relation to the minimum animal infective dose, have resulted in a working assumption that can be useful in deciding whether a microorganism presents a hazard to man in the laboratory. This assumption is, for diseases known to infect man, that the ID_{50} for man, monkey, mouse, and guinea pig are all approximately the same in the absence of a naturally acquired animal immunization. Sometimes the minimum dose necessary to produce obvious symptoms is less in man than in laboratory animals.[14] An associated working rule is that exceptions need to be proved by direct or good circumstantial evidence. Another useful concept is that as an infectious agent ceases to be primarily species-specific, decreases its minimum non-human infectious dose, and increases its range of susceptible species, it becomes increasingly hazardous for man.

With these assumptions in mind, a rough estimate can be made concerning the number of microorganisms it is safe to swallow from a pipette, inhale during various manipulations, or receive by accidental bite, cut, or injection. Among the relatively few high-risk agents, many routine techniques[12] produce sufficient aerosolized microbial-bearing particles to infect. Fortunately, the human infective dose for most microorganisms is high, so it requires a recognized accident or gross contamination to cause

clinical disease. For instance, in studies directed toward the viral etiology of human leukemia or cancer, the most frequently used items with major hazards probably would be the hypodermic syringe, pipette, high-speed blender, and centrifuge. The cumulative effect of repeated subinfective doses has not been examined systematically to the best of our knowledge. Statistically significant results would be very difficult to obtain because of the numerous variables, even among litter mates.[7] Practical experience among microbiologists indicates that for many diseases of man, subinfective doses inhaled daily are neutralized by the body defenses. Whether this will apply to concentrated leukemic materials will not be known for some time.

III. PRESENCE OF THE MICROORGANISM IN URINE AND FECES OF INOCULATED ANIMALS AS AN INDICATOR OF RISK

Animals inoculated with microorganisms pathogenic for man present an ill-defined hazard to the experimenter. In a survey at Fort Detrick,[17] 12% of the animal caretakers had been infected compared with 21% of the scientific personnel.

In 1963, Sulkin and co-workers[18] reported a survey of 2,262 laboratory infections. Included in these were 221 among animal caretakers, janitors, etc. compared with 1,534 in trained scientific personnel, 82 in students, and 87 in clerks, maintenance workers, occasional visitors, and others. Only a few of these infections can be attributed to bites, scratches, or accidents during inoculation. An outstanding example of infection by aerosolized viral-bearing particles from dried urine and feces in cage litter is that (Table 1) of 113 human cases of Soviet hemorrhagic fever after 357 wild mice and voles, which were asymptomatic carriers of the causative virus, had been placed in two small animal rooms in a research institute. Only three of the cases were persons in direct contact with the animals.

It is important to know whether the inoculated microorganism or a somewhat similar one is excreted in urine or feces after inoculation, in order to determine whether the animal facilities are adequate for research on those epizootic diseases of domestic animals for which a veterinary permit from the U.S. Department of Agriculture is required. Each disease and change in an experiment will vary in regard to the emphasis that needs to be placed upon preventing (i) infection of persons caring for animals, cleaning cages, and disposing of dead animals and cage litter; (ii) infection of the scientist-technician observing or handling caged infected animals; (iii) infection of persons in other departments, or of visitors; and (iv) complication of the experiment by uncontrolled variables such as augmenting the dose in inoculated animals or infecting control animals. In some cases, fecal or urinary excretion of microorganisms may require special caging to control dust-borne microbial-bearing particles, and special treatment such as steaming or autoclaving animal cages before removing the animal bedding during cage cleaning.

Table 3 is the result of a literature survey. Each number in the table identifies an associated literature citation. Results after ingestion or oral inoculation have been omitted because of possible excretion of the inoculum without multiplication. Except for man, results based upon recovery from urine or feces of naturally infected animals (not experimentally inoculated) usually have been omitted because neither the condition of the animal nor the method of infection might be comparable to those in the laboratory. Also, except for a few special cases of parenteral inoculation, intestinal diseases have not been included because excretion of the organism in feces of a susceptible animal is a foregone conclusion. No critical evaluation has been made of each reference. It is anticipated that anyone interested in a specific disease will make his own evaluation of the reported presence or absence of the microorganism. It is hoped that active experimenters in diseases for which no report is listed will

make sufficient examinations incidental to the primary purpose of their experiments so that, eventually, missing information for significant diseases and animals will be available. We are informed this would be most helpful in the expanding field of cancer-leukemia research as a guide in developing realistic precautions.

Review of Table 3 indicates that the only safe rule to follow is that precautions appropriate to the disease will be based on the assumption that the inoculated microorganism is excreted. The quantity of infective agent excreted, the time and regularity of excretion, and possible attenuation or potentiation of virulence or viability, are complicating variables. It seems best to assume that failure to recover the organism in urine or feces is valid only for the particular conditions at hand, and that results will vary with the strain of organism, animal, stage and severity of disease, diet, animal housing, sampling, and recovery methods. Among diseases of man, the failure to recover the causative organism of Rift Valley fever, the equine encephalitides, yellow fever, and the rickettsiae is significant. However, scattered positive recoveries among the equine encephalitides and typhus lead one to believe that under some conditions even yellow fever virus could be obtained from urine or feces.

IV. INFECTION OF UNINOCULATED CONTROL ANIMALS CAGED WITH OR NEAR INOCULATED ANIMALS AS AN INDICATOR OF RISK

Table 4 supplements information originally compiled by Wedum.[17] Additional data were obtained from a library review and a subsequent laboratory program designed to supply data for representative significant human diseases. Study of Table 4, the associated Table 3, and the references cited permits some interesting conclusions of value in assessing risk to the experimenter and to the experiment.

As a general rule, an animal that has received a microbial respiratory challenge by exposure either of its whole body or of the head only to microbial aerosol will infect a normal unexposed animal if they are placed in the same clean cage, subject to the following considerations:

1) This infection occurs from microorganisms loosed from the fur of the exposed animal and inhaled by the normal cagemate.[8]

2) Exposure of the head only reduces the chance of infection of the normal cagemate, but avoidance of normal cagemate infection by the technique of head-only exposure can be depended upon only for a proved set of experimental techniques (animal, organism, and microbial aerosol concentration).

3) Immediately after exposure to the microbial aerosol, placing the whole-body or head-only exposed animal in a closed cage ventilated by 150 liters of air per minute for 15 minutes, and then housing both animals in a closed cage ventilated at 65 liters per minute cannot be depended upon to prevent normal cagemate infection, except for a proved set of experimental conditions.

4) Infection of the normal cagemate usually can be avoided if all the fur on the body or head of an aerosol-exposed animal is forcefully ruffled by a manually manipulated jet of 150 liters of air per minute for 10 minutes[c] before the exposed anima and its normal unexposed cagemate are placed in a clean closed cage ventilated at 65 liters of air per minute.

5) Even in the absence of the forceful fur-washing technique by airjet, an animal whose whole body is exposed to a microbial aerosol ceases to be infective for a normal cagemate after 4 to 6 days in a closed ventilated cage, in terms of liberation of organisms from the fur.

Among diseases infectious for man, excluding intestinal diseases, presence of the causative agent in the urine and feces of the experimentally inoculated animal usually does not result in infection of normal cagemates, even in solid-bottomed cages. Nevertheless, in these cases precautions appropriate to the disease are necessary for the man who empties the contaminated bedding and cleans the cages, and for the animal caretaker.

As a general rule, among the communicable diseases of man studied in rabbits, small rodents, and monkeys, infection of normal cagemates by injected animals is rather unusual. (Bacterial intestinal infections are omitted from the rule.) Notable exceptions are among the tick-borne mite-borne viral hemorrhagic fevers, louping ill, lymphocytic choriomeningitis, monkey B virus disease, tuberculosis, and, to a lesser extent, poliomyelitis.

Bearing in mind the conditions and limitations of the general rule specified above, infection of normal cagemates is always an important warning of infectious danger to the animal caretaker and to the laboratory personnel working with the agent in animals, eggs, tissue culture, or other growth media. This warning becomes increasingly significant as cannibalism and ingestion of food and water contaminated by urine or feces are reduced or eliminated.

Pen, stall, or cagemate infection is common among many diseases of animals seldom found in man. These present little hazard to the laboratory experimenter.

The experiment must also be protected from uncontrolled variables during animal assay. This includes the standardization of animals, use of specific-pathogen-free (SPF) animals or "germ-free" animals, control of enzootic and epizootic outbreaks, animal diet, housing and care of animals, etc. Infection of normal cagemate control animals by the experimentally inoculated animals is just another aspect of this subject. Whenever infection of normal cagemates appears it deserves attention because it may cause augmentation of the experimental inoculum or otherwise disturb the course of the assay. If it cannot be controlled by a change in caging practices, some alteration in the experimental method may be needed, such as that of caging together only those animals receiving the same dosage of microorganisms.[3] Accidental infection or augmentation of dosage may occur through cannibalism, from skin or fur contaminated by the inoculum, from infectious nasal secretion, from infectious respiratory droplet nuclei, from infectious airborne dust originating in animal bedding contaminated by urine and feces, or by ingestion of food or water contaminated by urine, feces, or oral secretions.[8,13]

V. TABULAR SUMMATION

To aid in evaluating the indicators of risk presented in Tables 2, 3, and 4, the principal features of each table and one added element have been combined in Table 5. It would be useful to have information tabulated by laboratory-acquired disease showing how many of the infections were subclinical, mild, severe, or lethal, or to have some other standard such as average days lost from work or average days hospitalized. A detailed examination of frequency rates and severity rates was made by Phillips.[10] Seventh per cent or more of the cases were classified as resulting in no permanent disability, although the range in four summaries was from 31 to 93%. Deaths are included in Table 5 insofar as they are identified by single diseases in the citations. However, there were 107 deaths among the 2,348 cases reported in 1961,[15] and consequently the death rate is no less than 4.5%. Other series have fatality rates of 0.52 to 7.47%.[9]

In connection with column 2 of Table 5, readers will notice the omission of the data on respiratory and oral challenge that appear in Table 4. This omission was based on our findings that infection of a cagemate control animal after aerosol challenge of the test animal usually is due to mechanical transfer of organisms released from the fur of the test animal, and consequently is not a true transfer of the infection from one animal to the other.[8] Oral challenge likewise is often more of a cross contamination than it is a cross infection. Therefore, the infection of uninoculated cagemates in these instances indicates the hazard of the technique more than it does the hazard of the disease. This conservative view heightens the significance of the few plus signs in column 2 as indicators of risk.

There may be some disagreement with various individual points in Table 5, but it permits each investigator to add his own special knowledge and judge his own situation in the light of information on many other microorganisms.

LITERATURE CITED

1. Albrecht, J. 1965. Laboratoriumsinfektionen. Arztl. Lab. 11:135-142, and Deut. Med. Wochensch. 37:1637-1642.

2. Brooksby, J.B. 1961. Hazards of the animal house: Introductory remarks, p. 5-8. In Laboratory Animals Centre collected papers, Vol. 10. Hazards of the animal house. M.R.C. Laboratories, Carshalton, Surrey, England.

3. Casals, J.; Olitsky, P.K. 1945. Enduring immunity following vaccination of mice with formalin-inactivated virus of Russian spring-summer (Far Eastern tick-borne) encephalitis. J. Exp. Med. 82:431-443.

4. Chatigny, M.A. 1961. Protection against infection in the microbiology laboratory, devices and procedures, p. 131-192. In Wayne W. Umbreit (ed.) Advances in applied microbiology, Vol. 3. Academic Press, New York.

5. Chemical Rubber Co. 1967. CRC Handbook of laboratory safety. The Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, Ohio 44128, 568 p.

6. Eaton, M.D. 1940. Transmission of epidemic influenza virus in mice by contact. J. Bacteriol. 39:229-241.

7. Finkel, M.P.; Biskis, B.O.; Jinkins, P.B. 1966. Virus induction of osteosarcomas in mice. Science 151:698-701.

8. Kruse, R.H.; Green, T.D.; Leeder, W.D. 1967. Infection of control monkeys with Coccidioides immitis by caging with inoculated monkeys. p. 387-395. In L. Ajello (ed.) Coccidioidomycosis. University of Arizona Press, Tucson, Arizona.

9. Phillips, G.B. 1965. Microbiological hazards in the laboratory: Part I. Control. J. Chem. Education 42:A43-A48.

10. Phillips, G.B. 1965. Causal factors in microbiological laboratory accidents and infections, (Miscellaneous Publication 2). Industrial Health and Safety Division, Fort Detrick, Frederick, Maryland 21701, DDC AD 615 012N. 242 p.

11. Phillips, G.B.; Runkle, R.S. 1967. Laboratory design for microbiological safety. Appl. Microbiol. 15:378-389.

12. Reitman, M.; Wedum, A.G. 1956. Microbiological safety. Public Health Rep. 71:659-665.

13. Skinner, H.H. 1957. The virus of vesicular stomatitis in small experimental hosts: I. White mice, cotton rats, chicken embryos, and young chickens. J. Comp. Path. Therap. 67:69-86.

14. Smith, D.G.; Mamay, H.K.; Marshall, R.G.; Wagner, J.C. 1956. Venezuelan equine encephalomyelitis: Laboratory aspects of 14 human cases following vaccination and attempts to isolate the virus from the vaccine. Amer. J. Hyg. 63:150-164.

15. Sulkin, S.E. 1961. Laboratory-acquired infections. Bacteriol. Rev. 25:203-209.

16. Sulkin, S.E.; Long, E.R.; Pike, R.M.; Sigel, M.M.; Smith, C.E.; Wedum, A.G. 1963. Laboratory infections and accidents, p. 89-104. In Albert H. Harris and Marion B. Coleman (ed.) Diagnostic procedures and reagents. 4th ed. Amer. Public Health Ass., Inc., New York.

17. Wedum, A.G. 1964. Laboratory safety in research with infectious aerosols. Public Health Rep. 79:619-633.

18. Wedum, A.G.; Phillips, G.B. 1964. Criteria for design of a microbiological research laboratory. J. Amer. Soc. Heat. Refrig. Air Cond. (ASHRAE) 6:46-52.

TABLE 1. LABORATORY-ACQUIRED HUMAN INFECTIONS

Causative Agent or Disease	Number of Infections[a]	Literature Cited
Absettarov virus	1	1
Actinomycosis	3	24
Adenovirus	8	19
Amebiasis	20	24
Anthrax	36	24
Apeu virus	1	6, 10
Avian lymphomatosis	1	3
Bebaru virus	1	2
Blastomycosis	8	8
Brucellosis	274	19
Bunyamwera virus	6	19
Candidiasis	2	19
Chikungunya virus	19	10
Cholera	9	24
Coccidioidomycosis	108	8
Colorado tick fever	8	10
Coxsackie virus	35	19
Dengue	6	10
Dermatophytoses	84	8
Diphtheria	40	24
Eastern equine encephalitis	2	16, 28
ECHO virus	1	20
Erysipelothrix	32	24
Foot-and-mouth disease	2	7, 17
Ganjam virus	2	26
Germiston	3	10, 13
Glanders	14	24
Gonorrhea	4	24
Hemophilus influenzae	7	24
Hepatitis, infectious	126	19
Histoplasmosis	81	8
Hypr virus	4	1
Ilheus virus	1	15, 26
Influenza virus	7	21
Japanese B encephalitis	2	2, 25[b]
Junin virus	5	10
Kemerovo virus	[b]	25
Kunjin virus	2	5, 10
Kyasanur Forest disease	65	10
Leishmaniasis	4	24
Leptospirosis	45	24
Louping ill	21	10
Lymphocytic choriomeningitis	19	19
Lymphogranuloma venereum	6	19
Machupo virus	4	12
Malaria	13	19
Marituba	1	10
Mayaro virus	3	10
Measles	1	21
Meningococcus	5	24
Monkey B virus	11	19, 21
Mucambo virus	2	10
Mumps	3	21
Mycoplasma (PPLO)	1	19
Nairobi sheep disease	1	10
Negishi virus	[b]	25

Causative Agent or Disease	Number of Infections[a]	Literature Cited
Newcastle virus	32	19
Nocardiosis	1	19
Omsk hemorrhagic fever	3	10
Oriboca virus	1	10
Oropouche virus	2	10
Ovine dermatitis	5	19
Pasteurella leptiseptica	[b]	22
Piry virus	5	26
Plague	4	19
Pneumococcus	4	24
Poliomyelitis	9	19
Powassan virus	1	10
Pseudorabies (Aujeszky's disease)	1	20
Psittacosis	70	19, 21
Q fever	184	19
Rat bite fever	14	19
Relapsing fever	38	24
Rickettsial pox	6	19
Rift Valley fever	24	21
Rio Bravo virus	5	10, 23
Rocky Mountain spotted fever	23	19
Ross River virus	2	2
Russian Far East encephalitis	[b]	22
Russian spring-summer encephalitis	5	19
St. Louis encephalitis	1	10
Salmonellosis	54	24
Semliki Forest virus	1	4, 26
Serratia marcescens	4	24
Shigellosis	54	24
Smallpox	1	27
Soviet hemorrhagic fevers	113	14
Spondweni virus	2	10
Sporotrichosis	7	8
Staphylococcus	19	19
Streptococcus	67	24
Tetanus	6	24
Toxoplasmosis	21	19
Trachoma	5	19
Treponema pallidum	10	24
Trypanosomiasis	5	19
Tsutsugamushi (scrub typhus)	12	19
Tuberculosis	174	19
Tularemia	129	19
Typhoid	292	24
Typhus (endemic & epidemic)	82	19
Vaccinia	9	11, 22[b]
Venezuelan equine encephalitis	118	10
Vesicular stomatitis	54	10, 18
Vibrio fetus	1	19
Viral pneumonia (atypical)	[b]	22
Wesselsbron virus	4	10
Western equine encephalitis	6	1
West Nile virus	13	9, 10
Yellow fever	38	10, 21
Zika virus	1	10

a. The number includes reported subclinical infections.
b. Reference does not specify details or how many cases.

LITERATURE CITED FOR TABLE 1

1. American Committee on Arthropod-Borne Viruses. Subcommittee on Laboratory Infections, Unpublished preliminary report. Quotation authorized by Chairman Dr. R.P. Hanson, University of Wisconsin, Madison.

2. American Committee on Arthropod-Borne Viruses. Subcommittee on Laboratory Infections, Report at Annual Meeting, New Orleans, La. Nov. 1965. Chairman Dr. R.P. Hanson, University of Wisconsin, Madison.

3. Anonymous. 1964. Communique on cancer: "Infectious" cancer. Newsweek Magazine 6 April 1964, p. 80.

4. Clarke, D.H. 1961. Two nonfatal human infections with the virus of Eastern encephalitis. Amer. J. Trop. Med. Hyg. 10:67-70.

5. Doherty, R.L.; Standfast, H.A.; Westaway, E.G.; Gorman, B.M.; Allan, B.C. 1964. Report from Queensland Institute of Medical Research, Brisbane, Australia. Arthropod-borne Virus Inform. Exch. 10:17-19.

6. Gibbs, C.J., Jr.; Bruckner, E.A.; Schenker, S. 1964. A case of apeu virus infection. Amer. J. Trop. Med. Hyg. 13:108-113.

7. Gins, H.A. 1924. Maul-und Klauenseuche. Klin. Wochensch. 3:1135-1138.

8. Hanel, E., Jr.; Kruse, R.H. 1967. Laboratory-acquired mycoses. Miscellaneous Publication 28, Industrial Health and Safety Office, Fort Detrick, Frederick, Maryland 21701, 55 p.

9. Hannoun, Cl.; Corniou, B.; Causse, G.; Panthier, R. 1967. Evolution des anticorps seriques dans quatre cas d'infections a virus West Nile. Ann. Inst. Pasteur 113:29-36.

10. Hanson, R.P.; Sulkin, S.E.; Buescher, E.L.; Hammon, W.McD.; McKinney, R.W.; Work, T.H. 1967. Arbovirus infections of laboratory workers: Extent of problem emphasizes the need for more effective measures to reduce hazards. Science 158:1283-1286.

11. Horgan, E.S.; Haseeb, M.A. 1943. Some observations on accidental vaccinations on the hands of workers in a vaccine lymph institute. J. Hyg. 43:273-274.

12. Johnson, K.M.; MacKenzie, R.B.; Kuns, M.L. 1964. Epidemic hemorrhagic fever in Bolivia. Arthropod-borne Virus Inform. Exch. 9:65-70.

13. Kokernot, R.H.; Smithburn, K.C.; Paterson, H.E.; McIntosh, B.M. 1960. Isolation of germiston virus, a hitherto unknown agent from culicine mosquitoes, and a report of infection in two laboratory workers. Amer. J. Trop. Med. Hyg. 9:62-69.

14. Kulagin, S.M.; Fedorova, N.I.; Ketiladze, E.S. 1962. Laboratory outbreak of hemorrhagic fever with a renal syndrome: Clinoco-epidemological characteristics. Zh. Mikrobiol. Epidemiol. i Immunobiol. 33:10:121-126.

15. Laemmert, H.W., Jr.; Hughes, T.P. 1947. The virus of ilheus encephalitis: Isolation, serological specificity and transmission. J. Immunol. 55:61-67.

16. Olitsky, P.K.; Morgan, I.M. 1939. Protective antibodies against equine encephalomyelitis virus in the serum of laboratory workers. Proc. Soc. Exp. Biol. Med. 41:212-215.

17. Pape, J. 1921. Ein Beitrag zur Maul-und Klauenseuche des Menschen. Berl. Tierarztl. Wochensch. 37:354.

18. Patterson, W.C.; Mott, L.O.; Jenney, E.W. 1958. A study of vesicular stomatitis in man. J. Amer. Vet. Med. Ass. 133:57-62.

19. Pike, R.M.; Sulkin, S.E.; Schulze, M.L. 1965. Continuing importance of laboratory-acquired infections. Amer. J. Public Health 55:190-199.

20. Sulkin, S.E. 1961. Laboratory-acquired infections. Bacteriol. Rev. 25:203-209.

21. Sulkin, S.E.; Pike, R.M. 1949. Viral infections contracted in the laboratory. New Engl. J. Med. 241:205-213.

22. Sulkin, S.E.; Pike, R.M. 1951. Survey of laboratory-acquired infections. Amer. J. Public Health 41:769-781.

23. Sulkin, S.E.; Burns, K.F.; Shelton, D.F.; Wallis, C. 1962. Bat salivary gland virus: Infections of man and monkey. Texas Rep. Biol. Med. 20:113-127.

24. Sulkin, S.E.; Long, E.R.; Pike, R.M.; Sigel, M.M.; Smith, C.E.; Wedum, A.G. 1963. Laboratory infections and accidents, p. 89-104. In Albert H. Harris and Marion B. Coleman (ed.) Diagnostic procedures and reagents. 4th ed. Amer. Public Health Ass., Inc., New York.

25. Taylor, R.M. 1965. Report on the catalogue of the arthropod-borne viruses of the world. Arthropod-borne Virus Inform. Exch. 11:4-11.

26. Taylor, R.M. 1967. Catalogue of arthropod-borne viruses of the world: A collection of data on registered arthropod-borne animal viruses. Public Health Service Publ. No. 1760. Washington, D.C. 898 p.

27. Weinstein, I. 1947. Outbreak of smallpox in New York City. Amer. J. Public Health 37:1376-1384.

28. Wright, F.H. 1942. Antibodies in human serum which neutralize the viruses of equine encephalomyelitis. Amer. J. Hyg. 36:57-67.

TABLE 2. HUMAN INFECTIOUS DOSE

Causative Agent and Reference	Method of Inoculation	Growth Medium		Microbial Units per Human Infectious Dose
		Medium	Microbial Units per ml	
Malaria[1]	Intravenous	Blood	4×10^4	10
Q fever[2]	Inhalation	Egg yolk	1×10^{10} [a]	10 [a]
Salmonellosis[4]	Ingestion	Beef broth	1×10^9	10^6
Scrub typhus[3]	Intradermal	Egg yolk	15×10^3 [a]	3 [a]
Syphilis[3]	Intradermal	Rabbit testes [b]	36×10^6	57
Tularemia[5]	Intradermal	Broth	1×10^{10}	10
Tularemia[5]	Inhalation	Broth	1×10^{10}	10
Venezuelan equine encephalitis[6,8]	Subcutaneous	Egg	33×10^{10} [a]	1 [a]
West Nile fever[7]	Intramuscular	Mouse brain	33×10^9 [a]	1 [a]

a. In mouse or guinea pig infective units.
b. Centrifuged resuspended preparation.

LITERATURE CITED FOR TABLE 2

1. Boyd, M.F.; Kitchen, S.F. 1943. On attempts to hyperimmunize convalescents from vivax malaria. Amer. J. Trop. Med. 23:209-225.

2. Ley, H.L., Jr.; Smadel, J.E.; Diercks, F.H.; Paterson, P.Y. 1952. Immunization against scrub typhus: V. The infective dose of Rickettsia tsutsugamushi for men and mice. Amer. J. Hyg. 56:313-319.

3. Magnuson, H.J.; Thomas, E.W.; Olansky, S.; Kaplan, B.I.; deNello, L.; Cutler, J.C. 1956. Inoculation of syphilis in volunteers. Medicine 35:33-82.

4. McCullough, N.B.; Eisele, C.W. 1951. Experimental human salmonellosis. J. Infect. Dis. 88:278-289.

5. Saslaw, S.; Eigelsbach, H.T.; Wilson, H.E.; Prior, J.A.; Carhart, S. 1961. Tularemia vaccine study: I. Intracutaneous challenge; II. Respiratory challenge. Arch. Intern. Med. 107:689-701; 702-714.

6. Smith, D.G.; Mamay, H.K.; Marshall, R.G.; Wagner, J.C. 1956. Venezuelan equine encephalomyelitis: Laboratory aspects of 14 human cases following vaccination and attempts to isolate the virus from the vaccine. Amer. J. Hyg. 63:150-164.

7. Southam, C.M.; Moore, A.E. 1954. Induced virus infections in man by the Egypt isolates of West Nile virus. Amer. J. Trop. Med. Hyg. 3:19-50.

8. Sutton, L.S.; Brooke, C.C. 1954. Venezuelan equine encephalomyelitis due to vaccination in man. J. Amer. Med. Ass. 155:1473-1476.

9. Tigertt, W.D.; Benenson, A.S. 1956. Studies on Q fever in man. Trans. Ass. Amer. Phys. 69:98-104.

TABLE 3. RECOVERY OF SPECIFIC MICROORGANISMS FROM URINE AND FECES OF INFECTED ANIMALS

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Adenovirus	Cattle			23, 309	
	Chicken			47, 203	
	Dog	309		309	
	Man	128, 130, 309		71, 130, 160, 309, 53+	
	Monkey	452		61, 309	
	Mouse	139, 309, 346			309
	Swine			133	
African swine fever	Swine	87		62	
Aleutian disease	Mink	125, 192		125	
Anthrax	Cat			392	
	Cattle			297, 471	
	Chicken			392	
	Crow			272	
	Dog			15, 392	
	Fox			271	
	Guinea pig	370, 391		120, 391	
	Horse			392	
	Jackal			31	
	Man	287, 288		287, 288, 289	
	Monkey			115	
	Mouse	150		370	
	Rat			192	
	Sheep			65	
	Swine			65	
	Vulture			241	
Avian lymphomatosis	Chicken			50, 51, 52	
Bacteriophage	Dog	191, 313, 362			
	Guinea pig	11		11	
	Mouse	190, 313, 363		190	
	Rabbit			278	
	Rat	363			
Bittner agent	Mouse		9		9
Botulinum toxin	Guinea pig	263			
	Man	112, 262			
	Rabbit	146			
Brucellosis	Cattle	55, 214, 239, 406		55, 406	
	Chicken			96	
	Dog	93, 275, 414	276	275	
	Guinea pig	88, 93		88	
	Horse	406, 463	180	76, 180, 406	
	Man	8, 76, 137, 237, 406	473	8, 76, 406	473
	Rabbit	88			
	Rat	42, 76, 155			43
	Sheep	405, 409, 436, 461		406, 461	336
	Swine	122, 218, 257, 414		145	
Cholera	Guinea pig			322	
	Man	322		322	
	Mouse			322	
	Rabbit	322		322	
Coccidioidomycosis	Dog	235		235	381
	Man	21, 427, 469		19	
	Monkey				208
	Mouse			239	
Coxsackie A	Cattle			63	
	Man			106, 177, 224, 253, 438	
	Monkey			252	

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Coxsackie B	Cattle			63	
	Dog	161			
	Man	156,424,425		106,177,224,253,438	
	Mouse	168,300			
Cryptococcosis	Dog	234			234
	Man	30	258		258
	Pigeon			87,228,307	
Cytomegalic inclusion disease	Man	202,247,348,445			
	Mouse	248			248
Dengue	Man		194,379		
Distemper	Dog		119		
	Ferret		124		124
	Mink				124
Eastern equine encephalitis	Chicken			58	
	Crow			182	
	Horse		409		
	Mouse		420	420	
	Pheasant			352	148
	Rabbit			468	
ECHO virus	Chimpanzee			166	
	Dog			317	
	Man			106,224,253,274,438	
	Mouse				14
EDIM virus	Mouse	205		205	
Enterovirus,					
Avian	Chicken			402	
Bovine	Cattle			2,270,452	
Human ECHO 6	Dog			452	
Swine	Swine			183,184	
Encephalomyocarditis (EMC) virus	Man			9,441	
	Mouse	9,433		9	
	Rat	9	195	9,116	195
	Swine			114	
Erysipelothrix insidiosa	Swine			212,458	
Foot-and-mouth disease	Cattle	72,359,431,439,441	34	431,441	34,359
	Chicken			264	
	Guinea pig		34		34
	Man			200,331	
	Swine	250	34	250	34
Friend's virus	Mouse	266			266
Glanders	Donkey			47	
	Guinea pig	259			259
	Hamster	259			259
	Horse			47	
	Man			47	
Hepatitis, infectious	Dog	24,326			326
	Man	103,118,435	140,281	103,140,281,308,440	
Herpes simplex	Man	169			
	Monkey	188		188	
	Mouse	360,364,384,397	168		

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Histoplasmosis	Bat			201	
	Dog	327	36,79	327,342	36
	Guinea pig	110,333		110	
	Man	62		62,197,376	
Influenza	Dog	3			
	Guinea pig		369		
	Man	470			
	Mouse	384,385,386,388,389,474			
	Rabbit		369		
Japanese B encephalitis	Man	268,374	237	268	134,237
	Mouse	384			
Junin	Guinea pig	78			78
	Man	45			
K virus	Mouse	9,410		9,410	
Lactic dehydrogenase agent	Mouse	75,292,293,294,318		75,292,293,294,318	
Leptospirosis	Cat	99,443			
	Cattle	20,21,23,334,403,448			
	Dog	20,48,236,246,283,465		246	
	Guinea pig	69,165,290,448		164	
	Hamster	226			
	Horse	7,41,231,462,465			
	Man	12,20,165,171,267,312		164	
	Monkey	265			
	Mouse	20,40,187,394,456,462			
	Rat	20,115,164,291,353,462			
	Sheep	20,462			
	Swine	20,21,186,462			
Lymphocytic choriomeningitis	Guinea pig	418			
	Man	9,223,260			
	Monkey	11			
	Mouse	9,131,418,419,441		9,131,441	
Machupo	Cat		442		
	Guinea pig	174			
	Hamster	172,175		175	
	Man	123	173,176	176	173
	Marmoset	442			442
	Mouse-Calomys	172,175		174	
	Rabbit	174			
Mammary tumor agent	Mouse		277		277
Marek's disease	Chicken			35	
Measles (rubeola)	Man	127			
Melioidosis	Guinea pig	145,259			259
	Hamster	259			259
	Man	237,390		37	
	Rabbit	145			
	Rat	237			
	Sheep	70	71		
	Swine	347			
Moloney leukemogenic virus	Mouse	217,218			
Monkey B virus	Monkey		9		9,161,316
	Rabbit		316		

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Mouse hepatitis	Mouse	9,282		9,54,282,347	
Mouse pox	Mouse	9,97,98,384		9,46	
Mumps	Man	207,426,427,428,429			
Mycoplasma	Man	199,213,367		33,199,284	
Newcastle virus	Cat			21[illegible]	
	Chicken			17,[illegible],215,358	
	Dog	215		215	
	Duck			215	
	Fox	215		215	
	Goose			215	
	Man	215,339			
	Turkey			215	
Parainfluenza 5, DA	Monkey	59			
Plague	Man	237,121,422		91,237,319	
	Rat	237		237	
Poliomyelitis	Chicken				135
	Chimpanzee			39,151,152,153,251	
	Man	138,417		100,113,150,339,350,459	
	Monkey			66,89,104,153,206	
	Mouse	363			
	Rat	363			
Polyoma virus	Mouse	345,349		345	
Pseudorabies	Swine		245,371		245,371
Psittacosis-ornithosis	Cattle			22	
	Chicken			26,29,181	
	Dog				129
	Man			260	
	Monkey		209		209
	Parakeet			256	
	Parrot			163,340	
	Turkey			299	
Q fever	Cat	120	57		
	Cattle	28,38,49,211,449		28,211	158,159,303
	Chicken			398,400	
	Dog		57		
	Guinea pig	302,377,380		377	
	Horse		57		
	Man	56,80,81,269	64,220,378		64
	Mouse	258	377	377	
	Rat	399			
	Sheep	211,222	2,57,454	2,211,222,446,454	221,395
	Suslik	467		467	
Rabies	Hamster		18		
	Man	178			
	Mouse		18		
Reovirus	Cattle		343	343,452	
	Chimpanzee			452	
	Dog			452	
	Man		344	330,344,452	
	Monkey			452	
	Mouse			452	

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Rhinovirus	Cattle				1
	Horse			1,452	
	Man			423	53,407,408
Rift Valley fever	Cattle		77,85,279		279
	Goat		85		
	Man		77,85,101,237		
	Mouse		85,261		
	Sheep		77,101		85,86
Rinderpest	Cattle	9,132,149,227,286		9,132,149,227,477	
	Goat		477	477	
	Rabbit			365	
	Sheep		477	477	
Rubella	Ferret	90			
	Man	314,357,444		126,143,314	
	Monkey			305,306	
Russian spring-summer encephalitis	Horse		10		
	Man	225,382,383	141,437		141
	Monkey			320	
	Mouse	5,170,319,320,373,475		5,319,320	
	Rat	111			
St. Louis encephalitis	Chicken				332
	Horse		136		74,136
	Man		136,204		42,136,328,368
Sarcoma (SV-40) virus	Baboon	16			
	Monkey	16		254	
Semliki Forest virus	Hamster				144
Sendai virus	Mouse	410			
Serratia marcescens	Mouse	384			
	Rat	384			
Shigellosis	Rabbit			94,95	
Smallpox	Man		84		
	Monkey			167	
Soviet hemorrhagic fevers	Man	116,387			
	Mouse	210,387		210	
	Rat	210,387,466		210,466	
Staphylococcal enterotoxin	Rabbit	393		393	
Swine pox	Swine		185		
Teschen	Swine			6	6,142,244,476
Theiler's mouse encephalomyelitis	Mouse			54,301,413	
Tsutsugamushi	Man		68,189		
	Mouse		105		
	Rat		105		

Causative Agent or Disease	Animal	Urine		Feces	
		Recovered	Not Recovered	Recovered	Not Recovered
Tuberculosis	Cat	415		4	
	Cattle	92,132		92,132,450,451	
	Chicken			32,92,132,356	
	Dog	28,147,341,415		273,415	
	Guinea pig	109,311,351		109,232,310,311,351	
	Man	60,216,280,354,430		157,295,372	
	Monkey	109		338	
	Mouse	109		109,196	
	Rabbit	109,229,233		109,249	
	Rat			323	
Tularemia	Cattle	416		416	
	Guinea pig			304	
	Man	243			182
	Mouse	108,325		193,325	
	Rabbit	107			
	Sheep	416		416	
	Water buffalo	179			
Typhoid	Chimpanzee			421	
Typhus (endemic)	Cat	219			
	Guinea pig	240,285,323	298		
	Man		432		
	Mouse		298		
	Rat	27,240,285,460	324,464		324,464
Typhus (epidemic)	Guinea pig		298		
	Man		455		455
	Mouse		298		
Vaccinia	Man	37,128,457			
	Mouse	168			
	Rabbit	117			
Venezuelan equine encephalitis	Cotton rat	472		472	
	Guinea pig		335		
	Horse	198	335		198
	Man		375		375
	Mouse	401	296	296,401	
	Rabbit		335		
Western equine encephalitis	Chicken			44,58,332	
	Guinea pig		154,155		154,155
	Horse		136,235		136
	Man		136,204		136
	Monkey				154,255
	Pigeon				453
Yellow fever	Guinea pig		412		412
	Man		102,242,366,396,404		102,404
	Monkey		102,396,404		102,412
	Mouse		411,412		412

LITERATURE CITED FOR TABLE 3

1. Abinanti, F.R. 1965. The viral zoonoses, p. 196-211. In M. Sanders and E.H. Lennette (ed.) First Annual Symposium Applied Virology. Olympic Press, Inc., Sheboygan, Wisconsin.

2. Abinanti, F.R.; Welsh, H.H.; Lennette, E.H.; Brunetti, O. 1953. Q fever studies: XVI. Some aspects of the experimental infection induced in sheep by the intratracheal route of inoculation. Amer. J. Hyg. 57:170-184.

3. Ado, A.D.; Titova, S.M. 1959. A study of experimental influenza in dogs. Vopr. Virusol. 2:165-169.

4. Afshar, A. 1965. Virus diseases associated with bovine abortion and infertility. Vet. Bull. 35:735-752.

5. Albrecht, P. 1962. Pathogenesis of experimental infection with tick-borne encephalitis virus, p. 247-259. In E.H. Libikova (ed.) Biology of viruses of the tick-borne encephalitis complex. Proceedings of a symposium held at Smolenice, October 11-14, 1960. Czech. Acad. Sci., Praha.

6. Alexander, T.J.L. 1962. Viral encephalomyelitis of swine in Ontario: Experimental and natural transmission. Amer. J. Vet. Res. 23:756-762.

7. Alston, J.M.; Brown, J.C.; Doughty, C.J.A. 1958. Leptospirosis in man and animals. E. & S. Livingstone Ltd., Edinburgh. 367 p.

8. Amoss, H.L.; Poston, M.A. 1929. Undulant (Malta) fever: Isolation of the brucella organism from the stools. J. Amer. Med. Ass. 93:170-171.

9. Andrewes, C.; Pereira, H.G. 1967. Virus of vertebrates (2nd ed.) Bailliere, Tindall, and Cassel, London 432 p.

10. Andzhanaridze, O.G.; Zubova, Z.F.; Moskvicheva, N.V.; Nikitin, V.D. 1954. The excretion of tick encephalitis virus by the kidneys of the immunized horse. Zh. Mikrobiol. Epidemiol. i Immunobiol. 25:10:58-59.

11. Appelmans, R. 1921. Le bacteriophage dans l'organisme. Comp. Rend. Soc. Biol. (Paris) 85:722-724.

12. Arean, V.M. 1962. The pathologic anatomy and pathogenesis of fatal leptospirosis (Weil's disease). Amer. J. Pathol. 40:393-423.

13. Armstrong, C.; Lillie, R.D. 1934. Experimental lymphocytic choriomeningitis of monkeys and mice produced by a virus encountered in studies of the 1933 St. Louis encephalitis epidemic. Public Health Rep. 49:1019-1027.

14. Arnold, J.H.; Enders, J.F. 1950. Disease in Macacus monkeys inoculated with ECHO viruses. Proc. Soc. Exp. Biol. Med. 101: 513-516.

15. Arnous, _.; Brusasco, _.; Morris, _; Sani, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

16. Ashkenazi, A.; Melnick, J.L. 1962. Induced latent infection of monkeys with vacuolating SV-40 papova virus: Virus in kidneys and urine. Proc. Soc. Exp. Biol. Med. 111:367-372.

17. Asplin, F.D. 1952. Immunization against Newcastle disease with a virus of low virulence (Strain F) and observations on sub-clinical infection in partially resistant fowls. Vet. Rec. 64:245-249.

18. Atanasiu, P. 1965. Transmission de la rage par la voie respiratoire aux animaux de laboratoire. Compt. Rend. 261:277-279.

19. Atkinson, A.J.; Wolff, S.M. 1967. Primary pulmonary coccidioidomycosis with recovery of the fungus from the stool. Amer. Rev. Resp. Dis. 95:292-294.

20. Babudieri, B. 1958. Animal reservoirs of leptospires. Ann. N.Y. Acad. Sci. 70:393-413.

21. Baker, J. 1955. Leptospirosis of farm animals. Anim. Health Inst. Proc. 15:94-99.

22. Baker, J.A. 1958. Infections in mammals caused by members of the psittacosis group of viruses, p. 24-31. In F.R. Beaudette (ed.) Progress in psittacosis research and control. Rutgers University Press, New Brunswick, N.J.

23. Baker, J.A.; Little, R.B. 1948. Leptospirosis in cattle. J. Exp. Med. 88:295-308.

24. Baker, J.A.; Jensen, H.E.; Witter, R.E. 1954. Canine infectious hepatitis - fox encephalitis (Committee Report). J. Amer. Vet. Med. Ass. 124:214-216.

25. Bartha, A.; Aldasy, P. 1964. Isolation of adenovirus strains from calves with virus diarrhea. Acta Vet. Hung. 14:239-245.

26. Barwell, C.F. 1955. The transmission of viruses from animal to man other than by arthropods, p. 59-63. In C. Horton-Smith (ed.) Biological aspects of the transmission of disease. Oliver and Boyd, London.

27. Bell, E.J.; Philip, C.B. 1952. The human rickettsioses. Ann. Rev. Microbiol. 6:91-118.

28. Bell, E.J.; Parker, R.R.; Stoenner, H.G. 1949. Q fever: Experimental Q fever in cattle. Amer. J. Public Health 39:478-484.

29. Benedict, A.A.; McFarland, C. 1958. Newer methods for detection of avian ornithosis. Ann. N.Y. Acad. Sci. 70:501-515.

30. Benham, R.W. o935. Cryptococci: Their identification by morphology and serology. J. Infect. Dis. 57:255-274.

31. Bequet, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

32. Berensci, G.; Szabo, J. 1964. Uber ein spezielles. Problem der Epidemiologie der Tuberkulose. Huhner als Auscheider von Mykobakterien? Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 192:477-481.

33. Berg, R.L.; Daggett, W.; Madden, J.; Dienes, L. 1960. The origin of PPLO found in rectal cultures. Ann. N.Y. Acad. Sci. 79:635-641.

34. Bielang, O. 1923. Die Infektiositat von Kot und Harn bei maul-und-Klauenseuchekranken Meerschweinchen, Schweinen und Rindern. Thesis, Veterinary College of Berlin.

35. Biggs, P.M.; Payne, L.N. 1967. Studies on Marek's disease: I. Experimental transmission. J. Nat. Cancer Inst. 39:267-280.

36. Birge, R.F.; Riser, W.H. 1945. Canine histoplasmosis: Report of two cases. N. Amer. Vet. 26:281-287.

37. Blattner, R.J.; Norman, J.O.; Heys, F.M.; Aksu, I. 1964. Antibody response to cutaneous inoculation with vaccinia virus: Viremia and viruria in vaccinated children. J. Pediat. 64:839-852.

38. Blinov, P.N. 1958. The distribution of Rickettsia burneti in nature. Zh. Mikrobiol. Epidemiol. i Immunobiol. 29:8:85-88.

39. Bodian, D. 1953. Experimental studies on passive immunization against poliomyelitis: III. Passive-active immunization and pathogenesis after feeding in chimpanzees. Amer. J. Hyg. 58:81-100.

40. Bohl, E.H.; Ferguson, L.C. 1952. Leptospirosis in domestic animals. J. Amer. Vet. Med. Ass. 121:421-428.

41. Bokori, J.; Hirt, G.; Kasza, L.; Kemenas, F. 1958. Horse-leptospirosis in Hungary. Acta Vet. Acad. Sci. Hung. 8:265-289.

42. Bond, J.O.; Quick, D.T.; White, J.J.; Oard, H.C. 1965. The 1962 epidemic of St. Louis encephalitis in Florida: I. Epidemiologic observations. Amer. J. Epidemiol. 81:392-404.

43. Bosworth, T.J. 1937. The susceptibility of the wild rat to infection with Brucella abortus: A preliminary note. J. Comp. Pathol. 50:345-349.

44. Bourke, A.T.C. 1964. Contact transmission of the Highland J strain of western equine encephalomyelitis in chicks. Amer. J. Trop. Med. Hyg. 13:482-487.

45. Boxaca, M.C.; Parodi, A.S.; Rugiero, H.; Blay, R. 1963. Fievre hemorrhagique experimentale chez le cobaye par le virus Junin. Compt. Rend. Soc. Biol. 157:1817.

46. Briody, B.A. 1966. The natural history of mousepox, p. 105-116. In Robert Holdenried(ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

47. Brunn, W. 1919. Ueber die Ursacken und die Haufigkeit des Vorkommens des Rotzes beim Menschen, sowie uber die Massregeln zur Verkutung der Rotzubeitragungen. Vierteljahrsschrift Gerichtl. Med. Offentliches Sanit. 58:134-161.

48. Brunner, K.T.; Meyer, K.F. 1950. Effect of aureomycin on Leptospira canicola and Leptospira icterohaemorrhagiae in vitro and experimental carrier studies. Amer. J. Vet. Res. 11:89-90.

49. Burgdorfer, W.; Geigy, R.; Gsell, O.; Wiesmann, E. 1951. Parasitologische und klinische Beobachtungen an Q-Fieber-Fallen in der Schweiz. Schweiz. Med. Wochensch. 81:162-166.

50. Burmester, B.R. 1956. The shedding of the virus of visceral lymphomatosis in the saliva and feces of individual normal and lymphomatous chickens. Poultry Sci. 35:1089-1099.

51. Burmester, B.R.; Gentry, R.F. 1954. The presence of the virus causing visceral lymphomatosis in the secretions and excretions of chickens. Poultry Sci. 33:836-842.

52. Burmester, B.R.; Walter, W.G.; Gross, M.A.; Fontes, A.K. 1959. The oncogenic spectrum of two "pure" strains of avian leukosis. J. Nat. Cancer Inst. 23:277-291.

53. Bynoe, M.L.; Hobson, D.; Horner, J.; Kipps, A.; Schild, G.C.; Tyrrell, D.A.J. 1961. Inoculation of human volunteers with a strain of virus isolated from a common cold. Lancet 1:1194-1196.

54. Calisher, C.H.; Rowe, W.P. 1966. Mouse hepatitis, reo-3 and the Theiler viruses, p. 67-75. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

55. Cameron, H.S. 1932. The viability of Brucella abortus. Cornell Vet. 22:212-224.

56. Caminopetros, J. 1948. Q fever (Balkan grippe). Abstr. 4th Int. Congr. Trop. Med. Malaria. Washington, D.C. p. 33-34.

57. Caminopetros, J. 1948. Le lait, source de contamination de l'homme et des animaux dans la transmission de la fievre du Queensland observee en Grece. Bull. Acad. Nat. Med. (Paris) 132:468-471.

58. Chamberlain, R.W.; Sikes, R.W.; Kissling, R.E. 1954. Use of chicks in eastern and western equine encephalitis studies. J. Immunol. 73:106-114.

59. Chang, P.W.; Hsiung, C.D. 1964. Persistent infection with DA myxovirus in monkey kidney cells. Fed. Proc. 23:194.

60. Charnock, D.A. 1948. Chemotherapy for renal infections. Calif. Med. 69:445-448.

61. Cheever, F.S. 1957. Discussion of part IV. Viral identification and classification, conference on viruses in search of disease. Ann. N.Y. Acad. Sci. 67:427-429.

62. Christie, A. 1964. Histoplasmosis, p. 206-216. In F.H. Top (ed.) Communicable and infectious diseases; Diagnosis, prevention, treatment. 5th ed. C.V. Mosby Co., St. Louis, Mo.

63. Christov, St.; Karadjov, I.; Pavlov, N.; Andreev, I. 1965. Investigation of enteroviruses isolated from calves with gastroenteric disease. Bull. Off. Int. Epiz. 63:449-468.

64. Chudnoff, J.S.; Bower, A.G. 1950. Chronic relapsing Q fever: Treatment with streptomycin, aureomycin, and chloramphenicol. Calif. Med. 73:260-266.

65. Ciuca, _.; Fenea, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

66. Clark, P.F.; Roberts, D.J.; Preston, W.S., Jr. 1932. Passage of poliomyelitis virus through the intestinal tract. J. Prev. Med. 6:47-58.

67. Clemmer, D.L. 1965. Experimental enteric infection of chickens with an avian adenovirus. Proc. Soc. Exp. Biol. Med. 118:943-948.

68. Cooper, W.C.; Lien, J.C.; Hsu, S.H.; Chen, W.F. 1964. Scrub typhus in the Pescadores Islands: An epidemiologic and clinical study. Amer. J. Trop. Med. Hyg. 13:833-838.

69. Costa, S.; Troisier, J. 1917. Virulence des centres nerveux dans la spirochetose icterohemorrhagique experimentale du cobaye. Compt. Rend. Soc. Biol. 80:196-197.

70. Cottew, G.S. 1950. Melioidosis in sheep in Queensland: A description of the causal organism. Australian J. Exp. Biol. Med. Sci. 28:677-683.

71. Cottew, G.S.; Sutherland, A.K.; Meehan, J.F. 1952. Melioidosis in sheep in Queensland; description of an outbreak. Australian Vet. J. 28:113-123.

72. Cottral, G.E.; Gailiunas, P.; Cox, B.F. 1963. Foot-and-mouth disease transmitted in bull semen. J. Amer. Vet. Med. Ass. 143:784.

73. Couch, R.B.; Chanock, R.M.; Cate, T.R.; Lang, D.J.; Knight, V.; Huebner, R.J. 1963. Immunization with types 4 and 7 adenovirus by selective infection of the intestinal tract. Amer. Rev. Resp. Dis. 88:394-403.

74. Cox, H.R.; Philip, C.B.; Kilpatrick, J.W. 1941. Susceptibility of horses to St. Louis encephalitis virus. Public Health Rep. 56:1391-1392.

75. Crispens, C.G., Jr. 1964. On the epizootiology of the lactic dehydrogenase agent. J. Nat. Cancer Inst. 32:497-505.

76. Dalrymple-Champneys, W. 1960. Brucella infection and undulant fever in man. Oxford University Press, London. 196 p.

77. Daubney, R.; Hudson, J.R.; Garnham, P.C. 1931. Enzootic hepatitis or Rift Valley fever: An undescribed virus disease of sheep, cattle, and man from East Africa. J. Pathol. Bacteriol. 34:545-579.

78. DeGuerrero, L.B.; Boxaca, M.C.; Parodi, A.S. 1965. Fiebre hemorragica experimental en cobayos (Virus Junin). Contagio y eliminacion de virus. Rev. Asoc. Med. Argent. 79:271-274.

79. DeMonbreun, W.A. 1939. The dog as a natural host for Histoplasma capsulatum; report of a case of histoplasmosis in this animal. Amer. J. Trop. Med. 19:565-587.

80. Derrick, E.H. 1937. "Q" fever, a new fever entity: Clinical features, diagnosis, and laboratory investigation. Med. J. Australia 2:281-299.

81. Derrick, E.H. 1953. The epidemiology of "Q" fever: A review. Med. J. Australia 1:245-253.

82. DeTray, D.E. 1963. African swine fever. Advances Vet. Sci. 8:299-333.

83. Dinter, Z.; Bakos, K. 1953. Uber die Ausscheidung des Virus der Newcastle-Krankheit nach der Testinfektion immuner Huhner. Arch. Exp. Veterinaermed. 7:514-519.

84. Dixon, C.W. 1962. Smallpox. J. & A. Churchill Ltd., London. 512 p.

85. Easterday, B.C. 1961. Experimental Rift Valley fever. Doctoral thesis. University of Wisconsin, Madison.

86. Easterday, B.C.; Murphy, L.C.; Bennett, D.G. 1962. Experimental Rift Valley fever in lambs and sheep. Amer. J. Vet. Res. 23:1231-1240.

87. Emmons, C.W. 1955. Saprophytic sources of Cryptococcus neoformans associated with the pigeon (Columba livia). Amer. J. Hyg. 62:227-232.

88. Eyre, J.W. 1905. Observations on the virulence of Micrococcus melitensis for the guinea pig. Rep. Mediter. Fever Comm. I:21-45.

89. Faber, H.K.; Silverberg, R.J.; Dong, L. 1948. Poliomyelitis in the cynomolgus monkey: IV. Further observations on exposures confined to the stomach and intestines, with notes on the fecal excretion of virus. J. Exp. Med. 88:65-72.

90. Fabiyi, A.; Gitnick, G.L.; Sever, J.L. 1967. Chronic rubella virus infection in the ferret (Mustela putorius fero) puppy. Proc. Soc. Exp. Biol. Med. 125:766-771.

91. Federov, V.N.; Rogozin, I.I., Fenyuls, B.K. 1955. Prophylaxis of plague. 2nd ed. Medgiz, Moscow. 228 p.

92. Feldman, W.H. 1963. Tuberculosis, p. 5-81. In T.G. Hull (ed.) Diseases transmitted from animals to man. 5th ed. Charles C. Thomas, Springfield, Ill.

93. Feldman, W.H.; Bollman, J.L.; Olson, C., Jr. 1935. Experimental brucellosis in dogs. J. Infect. Dis. 56:321-332.

94. Felsen, J.; Osofsky, A.G. 1934. Sonne dysentery. J. Amer. Med. Ass. 103:966-971.

95. Felsen, J.; Rundlett, E.V.; Sullivan, J.; Gorenberg, H. 1934. Atypical Flexner dysentery: A preliminary report of the Jersey City epidemic. J. Amer. Med. Ass. 103:1055-1058.

96. Felsenfeld, O.; Young, V.M.; Loeffler, E.; Ishihara, S.J.; Schroeder, W.F. 1951. A study of the nature of brucellosis in chickens. Amer. J. Vet. Res. 12:48-54.

97. Fenner, F. 1947. Studies in infectious ectromelia in mice. II. Natural transmission: The portal of entry of the virus. Australian J. Exp. Biol. Med. Sci. 25:275-282.

98. Fenner, F. 1947. Studies in infectious ectromelia in mice (Mouse pox). III. Natural transmission: Elimination of the virus. Australian J. Exp. Biol. Med. Sci. 25:327-335.

99. Fessler, J.F.; Morter, R.L. 1964. Experimental feline leptospirosis. Cornell Vet. 54:176-190.

100. Fieldsteel, A.H.; Chin, T.D.Y. 1962. An epidemiologic and immunologic study of poliomyelitis on an Indian reservation. Amer. J. Hyg. 76:1-14.

101. Findlay, G.M. 1932. Rift Valley fever or enzootic hepatitis. Trans. Roy. Soc. Trop. Med. Hyg. 25:229-265.

102. Findlay, G.M.; MacCallum, F.O. 1939. The transmission of yellow fever virus to monkeys by mouth. J. Pathol. Bacteriol. 49:53-61.

103. Findlay, G.M.; Willcox, R.R. 1945. Transmission of infective hepatitis by faeces and urine. Lancet 1:212.

104. Flexner, S.; Clark, P.F.; Dochez, A.R. 1912. Experimental poliomyelitis in monkeys: XIII. Survival of the poliomyelitic virus in the stomach and intestine. J. Amer. Med. Ass. 59:273.

105. Fox, J.P. 1948. The long persistence of Rickettsia orientalis in the blood and tissues of infected animals. J. Immunol. 59:109-114.

106. Fox, J.P. 1964. Epidemiological aspects of Coxsackie and ECHO virus infection in tropical areas. Amer. J. Public Health 54:1134-1142.

107. Francis, E.; Lake, G.C. 1921. Experimental transmission of tularemia in rabbits by the rabbit louse, Haemodipsus ventricosus (Denny). Public Health Rep. 36:1747-1753.

108. Francis, E.; Lake, G.C. 1922. Transmission of tularemia by the mouse louse Polyplax serratus (Brum.). Public Health Rep. 37:96-101.

109. Francis, J. 1958. Tuberculosis in animals and man: A study in comparative pathology. Cassell and Company Ltd., London. 357 p.

110. Freour, P.; Claveleau, M. 1951. Note sur la transmission experimentale de l'histoplasmose par voie pulmonaire. J. Franc. Med. Chir. Thorac. 5:578-583.

111. Freyman, R. 1957. The virus encephalitides in the Soviet Union and in central Europe. Rep. Osteuropa-Inst. Univ. Berlin No. 28 Med. Ser. 11:1-102.

112. Friedman, S.M.; Lorber, B.B. 1937. Bacteriological investigation of fluids and excrement of botulism patients. In Shteynberg, Botulism, Gosmedizdat Publ. House, UkSSR, 1937. Cited by K.I. Matveev. 1949. The pathogenesis of botulism. Publ. House Acad. Med. Sci. USSR, Moscow. 271 p.

113. Furesz, J.; Armstrong, R.E.; Yarosh, W.; Nagler, F.P. 1964. Genetic markers of poliovirus strains isolated from paralytic patients prior to and after Sabin vaccination programs: I. Studies on type 1 strains. Amer. J. Hyg. 80:45-54.

114. Gainer, J.H. 1961. Studies on the natural and experimental infections of animals in Florida with the encephalomyocarditis virus, p. 556-572. Proc. U.S. Livestock Sanitary Ass. 65th Annual Meeting, Oct-Nov 1961.

115. Gale, N.B. 1963. Leptospires isolated in the Panama Canal Zone. Amer. J. Trop. Med. Hyg. 12:895.

116. Germer, W.D. 1955. Die hemorrhagischen Fieber. Besondered Berucksichtigung des in Korea auftretenden hemorrhagischen Fiebers. Deut. Med. Wochensch. 80:1717-1721.

117. Gildemeister, E.; Hilgers, P. 1930. Ueber den Nachweis von Vakzinevirus im Liquor und im Urin kutan geimpfter Kaninchen. Deut. Med. Wochensch. 56:312-313.

118. Giles, J.P.; Liebhaber, H.; Krugman, S.; Lattimer, C. 1964. Early viremia and viruria in infectious hepatitis. Virology 24:107-108.

119. Gillespie, J.H. 1962. The viruses of canine distemper. Ann. N.Y. Acad. Sci. 101:540-547.

120. Gillespie, J.H.; Baker, J.A. 1952. Experimental Q fever in cats. Amer. J. Vet. Res. 13:91-94.

121. Goldman, M.J.; Movitt, E. 1948. Disseminated coccidioidomycosis: Isolation of positive organism from the urine. Calif. Med. 69:456-458.

122. Goode, E.R.; Manthei, C.A.; Blake, G.E.; Amerault, T.E. 1952. Brucella suis infection in suckling and weanling pigs: II. J. Amer. Vet. Med. Ass. 121:456-464.

123. Gorelick, A.N. 1964. Report from Dr. Arthur N. Gorelick. Arthropod-borne Virus Inform. Exch. 10:150-152.

124. Gorham, J.R.; Brandly, C.A. 1953. The transmission of distemper among ferrets and mink, p. 129-141. Proc. Amer. Vet. Med. Ass. 90th Annual Meeting, Toronto, July 20-23.

125. Gorham, J.R.; Leader, R.W.; Henson, J.B. 1964. The experimental transmission of a virus causing hypergammaglobulinemia in mink: Sources and modes of infection. J. Infect. Dis. 114:341-345.

126. Green, R.H.; Balsamo, M.R.; Giles, J.P.; Krugman, S.; Mirick, G.S. 1965. Studies of the natural history and prevention of rubella. Amer. J. Dis. Child. 110:348-365.

127. Gresser, I.; Katz, S.L. 1960. Isolation of measles virus from urine. New Engl. J. Med. 263:452-454.

128. Gresser, I.; Kibrick, S. 1961. Isolation of vaccinia virus and type 1 adenovirus from urine. New Engl. J. Med. 265:743-744.

129. Groulade, P.; Roger, F.; Dartois, N. 1954. Contribution a l'etude d'un syndrome infectieux du chien repon dant serologiquement a une souche de Rickettsia psittaci. Rev. Pathol. Gen. Comp. 54:1426-1434.

130. Gutekunst, R.R.; Heggie, A.D. 1961. Viremia and viruria in adenovirus infections: Detection in patients with rubella and rubelliform illness. New Engl. J. Med. 264:374-378.

131. Haas, V.N. 1941. Studies on the natural history of the virus of lymphocytic choriomeningitis in mice. Public Health Rep. 56:285-292.

132. Hagan, W.A.; Bruner, D.W. 1961. The infectious diseases of domestic animals; with special reference to etiology, diagnosis, and biologic therapy. Bailliere, Tindall and Cox, London. 1033 p.

133. Haig, D.A.; Clarke, M.C.; Pareira, M.S. 1964. Isolation of an adenovirus from a pig. J. Comp. Pathol. 74:81-84.

134. Halstead, S.B. 1958. Dept. of Virus and Rickettsial Diseases. Annual Report. 406th Medical General Laboratory. U.S. Army, Japan. Zama, Japan.

135. Hammon, W.McD.; Mack, W.N.; Reeves, W.C. 1947. The significance of protection tests with the serum of man and other animals against the Lansing strain of poliomyelitis virus. J. Immunol. 57:285-299.

136. Hammon, W.McD.; Reeves, W.C.; Gray, M. 1943. Mosquito vectors and inapparent animal reservoirs of St. Louis and western equine encephalitis viruses. Amer. J. Public Health 33:201-207.

137. Hardy, A.V.; Hudson, M.G.; Jordan, C.F. 1929. The skin as a portal of entry in Br. melitensis infections. J. Infect. Dis. 45:271-282.

138. Hart, A.F.; Cherry, J.D. 1965. Cytology of the urine in children after oral poliovirus vaccine. New Engl. J. Med. 272:174-179.

139. Hartley, J.W.; Rowe, W.P. 1960. A new mouse virus apparently related to the adenovirus group. Virology 11:645-647.

140. Havens, W.P., Jr. 1946. Period of infectivity of patients with experimentally induced infectious hepatitis. J. Exp. Med. 83: 251-258.

141. Haymaker, W.; Sather, G.E.; Hammon, W.McD. 1955. Accidental Russian spring-summer viral encephalitis. Arch. Neurol. Psychiat. 73:609-630.

142. Hecke, F. 1964. Das Verhalten hoher Kulturpassagen des Teschenvirus Konratice im Tierkorper nach oraler Verabreichung: II. Die parenteral verlaufende Infektion. Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 192:169-182.

143. Heggie, A.D.; Robbins, F.C. 1964. Rubella in naval recruits. New Engl. J. Med. 271:231-234.

144. Henderson, D.W.; Peacock, S.; Randles, W.J. 1967. On the pathogenesis of Semliki Forest virus (SFV) infection in the hamster. Brit. J. Exp. Pathol. 48:228-234.

145. Henning, M.W. 1956. Animal diseases in South Africa; being an account of the infectious diseases of domestic animals. 3rd ed. Central News Agency Ltd., S. Afr. 1239 p.

146. Hildebrand, G.J.; Lamanna, C.; Heckly, R.J. 1961. Distribution and particle size of type A botulism toxin in body fluids of intravenously injected rabbits. Proc. Soc. Exp. Biol. Med. 107: 284-289.

147. Hjarre, A.; Herlitz, C.W. 1935. Die eventuelle Uberfuhrung der Tuberkulose Swischen Hund resp. Katze und Mensch. Acta Paediat. 17:141-149.

148. Holden, P. 1955. Transmission of eastern equine encephalomyelitis in ring-necked pheasants. Proc. Soc. Exp. Biol. Med. 88:607-610.

149. Hornby, H.E. 1926. Studies in rinderpest immunity: II. Methods of infection. Vet. J. 82:348-355.

150. Horstmann, D.M.; Opton, E.M.; Klemperer, R.; Llado, B.; Vignec, A.J. 1964. Viremia in infants vaccinated with oral poliovirus vaccine (Sabin). Amer. J. Hyg. 79:47-63.

151. Howe, H.A.; Bodian, D. 1944. Poliomyelitis by accidental contagion in the chimpanzee. J. Exp. Med. 80:383-390.

152. Howe, H.A.; Bodian, D. 1944. The efficiency of intranasal inoculation as a means of recovering poliomyelitis virus from stools. Amer. J. Hyg. 40:224-226.

153. Howe, H.A.; Bodian, D.; Morgan, I.M. 1950. Subclinical poliomyelitis in the chimpanzee and its relation to alimentary reinfection. Amer. J. Hyg. 51:85-108.

154. Howitt, B.F. 1932. Equine encephalomyelitis. J. Infect. Dis. 51:493-510.

155. Howitt, B.F. 1934. Certain properties of the virus of equine encephalomyelitis. J. Infect. Dis. 55:138-149.

156. Howitt, B.F. 1950. Recovery of the Coxsackie group of viruses from human sources. Proc. Soc. Exp. Biol. Med. 73:443-448.

157. Hudson, E.H. 1957. Respiratory tuberculosis: Clinical diagnosis and medical treatment, p. 321-462. In F.R.G. Heaf (ed.) Symposium of tuberculosis. Cassell and Company Ltd., London.

158. Huebner, R.J.; Luoto, L.; Turner, H.C. 1950. Cited by R.J. Huebner, In Rickettsialpox and Q fever. Bacteriol. Rev. 14:245-248.

159. Huebner, R.J.; Jellison, W.L.; Beck, M.D.; Parker, R.R.; Shepard, C.C. 1948. Q fever studies in southern California: I. Recovery of Rickettsia burneti from raw milk. Public Health Rep. 63:214-222.

160. Huebner, R.J.; Rowe, W.P.; Ward, T.G.; Parrott, R.H.; Bell, J.A. 1954. Adenoidal-pharyngeal-conjunctival agents: Newly recognized group of common viruses of respiratory system. New Engl. J. Med. 251:1077-1086.

161. Hull, R.N.; Minner, J.R.; Mascoli, C.C. 1958. New viral agents recovered from tissue cultures of monkey kidney cells: III. Recovery of additional agents both from cultures of monkey tissues and directly from tissues and excreta. Amer. J. Hyg. 68:31-44.

162. Hunt, J.S. 1947. Pleuropulmonary tularemia: Observations on 12 cases treated with streptomycin. Ann. Intern. Med. 26:263-276.

163. Hutyra, F.; Marek, J.; Manninger, R. 1946. Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

164. Ido, Y.; Hoki, R.; Ito, H.; Wani, H. 1917. The rat as a carrier of Spirochaeta icterohaemorrhagiae, the causative agent of Weil's disease (Spirochaetosis icterohaemorrhagica). J. Exp. Med. 26:341-353.

165. Inada, R.; Ido, Y.; Hoki, R.; Kaneko, R.; Ito, H. 1916. The etiology, mode of infection, and specific therapy of Weil's disease (Spriochaetosis icterohaemorrhagica). J. Exp. Med. 23:377-402.

166. Itoh, H.; Melnick, J.L. 1957. The infection of chimpanzees with ECHO viruses. J. Exp. Med. 106:677-688.

167. Janssen, R.J.; Marshall, R.G.; Gerone, P.J.; Cheville, N.E. 1962. The effects of 6-mercaptopurine on variola infections in rhesus monkeys: I. The influence of the drug on the resistance and immunological response of the infected host. J. Infect. Dis. 111:155-162.

168. Jensen, M.M. 1965. Experimental viral infections of the urinary tract of mice. J. Infect. Dis. 115:370-376.

169. Jensen, M.M.; Jackson, N.L.; Guze, L.B. 1965. Virus isolation attempt from urine of patients with renal disease. J. Urol. 93:338-339.

170. Jervis, G.A.; Higgins, G.H. 1953. Russian spring-summer encephalitis: Clinico-pathologic report of a case in the human. J. Neuropathol. Exp. Neurol. 12:1-10.

171. Johnson, D.W. 1950. The Australian leptospirosis. Med. J. Australia 2:724-731.

172. Johnson, K.M. 1965. Epidemiology of Machupo virus infection: III. Significance of virological observations in man and animals. Amer. J. Trop. Med. Hyg. 14:816-818.

173. Johnson, K.M. 1965. Hemorrhagic fevers in the Americas: Epidemiology of Machupo virus infections. Cited by R.G. Douglas, Jr., N.W. Wiebenga, and R.B. Couch. Bolivian hemorrhagic fever probably transmitted by personal contact. Amer. J. Epidemiol. 82:85-91.

174. Johnson, K.M. 1965. Letter to Dr. A.G. Wedum, U.S. Army Biological Laboratories, Frederick, Maryland, from Dr. Karl M. Johnson, Middle America Research Unit, Canal Zone, dated 30 August 1965.

175. Johnson, K.M.; MacKenzie, R.B.; Webb, P.A.; Kuns, M.L. 1965. Chronic infection of rodents by Machupo virus. Science 150: 1618-1619.

176. Johnson, K.M.; Halstead, S.B.; Cohen, S.N. 1967. Hemorrhagic fevers of Southeast Asia and South America: A comparative appraisal. Progr. Med. Virol. 9:105-158.

177. Johnson, T. 1955. Simultaneous recovery of two or more immunological types of Coxsackie virus from the same patient. Arch. Ges. Virusforsch. 6:242-249.

178. Jonesco, D. 1928. Virulence de l'urine dans la rage humaine. Compt. Rend. Soc. Biol. 97:1731-1733.

179. Kamil, S.; Bilal, S. 1938. Recherches experimentales sur l'etiologie de la tularemie in turguie. Ann. Parasitol. 16:530-542.

180. Karlson, A.G.; Boyd, W.L. 1940. Brucellosis in horses: A study of five cases without clinical symptoms. J. Amer. Vet. Med. Ass. 97:576-580.

181. Karrer, H.; Meyer, K.F.; Eddie, B. 1950. The complement fixation inhibition test and its application to the diagnosis of ornithosis in chickens and in ducks: II. Confirmation of the specificity and epidemiological application of the test. J. Infect. Dis. 87:24-36.

182. Karstad, L.; Spalatin, J.; Hanson, R.P. 1959. Experimental infections of wild birds with the viruses of eastern equine encephalitis, Newcastle disease, and vesicular stomatitis. J. Infect. Dis. 105:188-195.

183. Kasza, L. 1965. Swine polioencephalomyelitis viruses isolated from the brains and intestines of pigs. Amer. J. Vet. Res. 26:131-137.

184. Kasza, L.; Alder, A. 1965. Biologic and immunologic characterization of six swine enterovirus isolates. Amer. J. Vet. Res. 26:625-630.

185. Kasza, L.; Griesemer, R.A. 1962. Experimental swine pox. Amer. J. Vet. Res. 23:443-451.

186. Kasza, L.; Kemenes, F.; Szemeredi, Gy.; Szeky, A. 1958. Abortion in swine due to Leptospira hyos. Acta. Vet. Acad. Sci. Hung. 8:199-207.

187. Kathe, J. 1950. Die Epidemiologie der Leptospirenerkrankungen. Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 155:199-226.

188. Katzin, D.S.; Connor, J.D.; Wilson, L.A.; Sexton, R.S. 1967. Experimental herpes simplex infection in the owl monkey. Proc. Soc. Exp. Biol. Med. 125:391-398.

189. Kawamura, R. 1926. Studies on tsutsugamushi disease. Spokesman Printing Co., Cincinnati, Ohio. 229 p.

190. Keller, R.; Engley, F.B., Jr. 1958. Fate of bacteriophage particles introduced into mice by various routes. Proc. Soc. Exp. Biol. Med. 98:577-580.

191. Keller, R.; Zatzman, M.L. 1959. Studies on the factors concerned in the disappearance of bacteriophage particles from the animal body. J. Immunol. 83:167-172.

192. Kenyon, A.J.; Helmboldt, C.F.; Nielsen, S.W. 1963. Experimental transmission of Aleutian disease with urine. Amer. J. Vet. Res. 24:1066-1067.

193. Khatenever, L.M. 1943. Certain characteristics of epidemiological, clinical, and laboratory diagnosis of typhoid forms of tularemia. Klin. Med. (USSR) 21:28-35.

194. Khouri, J. 1928. Quelques observations parasitologiques et biochimiques concernant l'urine dans le fievre dengue. Bull. Soc. Pathol. Exot. 21:92-94.

195. Kilham, L.; Mason, P.; Davies, J.N.P. 1955. Pathogenesis of fatal encephalomyocarditis (EMC) virus infections in albino rats. Proc. Soc. Exp. Biol. Med. 90:383-387.

196. Kirchheimer, W.F.; Hess, A.R.; Williston, E.H.; Youmans, G.P. 1950. Isolation of tubercle bacilli from feces and gastric contents of intravenously infected mice. Amer. Rev. Tuberc. 62:481-483.

197. Kiseleva, M.L. 1957. The clinical aspects, diagnosis, and epidemiology of histoplasmosis. Sovet. Med. (USSR) 21:89-94.

198. Kissling, R.E.; Chamberlain, R.W.; Nelson, D.B.; Stamm, D.D. 1956. Venezuelan equine encephalomyelitis in horses. Amer. J. Hyg. 63:274-287.

199. Klieneberger-Nobel, E. 1960. Pathogenicity and immunity of organisms of the pleuropneumonia group. Ann. N.Y. Acad. Sci. 79:615-625.

200. Kling, C.; Huss, R.; Olin, G. 1939. Presence der virus de la lievre aphteuse dans le contenu intestinal d'un humain vivant dans un milieu infecte. Compt. Rend. Soc. Biol. 131:478-480.

201. Klite, P.D. 1965. Isolation of Histoplasma capsulatum from bats of El Salvador. Amer. J. Trop. Med. Hyg. 14:787-788.

202. Kluge, R.C.; Wicksman, R.S.; Weller, T.H. 1960. Cytomegalic inclusion disease of the newborn. Report of case with persistent viruria. Pediatrics 25:35-39.

203. Kohn, A. 1962. Galus adeno-like virus in chickens: Studies on infection, excretion, and immunity. Amer. J. Vet. Res. 94:562-567.

204. Kokernot, R.H.; Shinefield, H.R.; Longshore, W.A. 1953. The 1952 outbreak of encephalitis in California: Differential diagnosis. Calif. Med. 79:73-77.

205. Kraft, L.M. 1958. Observations on the control and natural history of epidemic diarrhea of infant mice (EDIM). Yale J. Biol. Med. 31:121-137.

206. Kramer, S.D.; Hoskwith, B.; Grossman, L.H. 1939. Detection of the virus of poliomyelitis in the nose and throat and gastrointestinal tract of human beings and monkeys. J. Exp. Med. 69:49-67.

207. Krugman, S.; Ward, R. 1958. Infectious diseases of children. C.V. Mosby Co., St. Louis, Missouri. 340 p.

208. Kruse, R.H.; Green, T.D.; Leeder, W.D. 1967. Infection of control monkeys with Coccidioides immitis by caging with inoculated monkeys, p. 387-395. In L. Ajello (ed.) Coccidioidomycosis. Univ. of Arizona Press, Tucson, Arizona.

209. Kuborina, L.N.; Terskikh, I.I. 1960. Experimental ornithosis in monkeys. Vop. Virusol. 5:71-80.

210. Kulagin, S.M.; Fedorova, N.I.; Ketiladze, E.S. 1962. Laboratory outbreak of hemorrhagic fever with a renal syndrome: Clinico-epidemiological characteristics. Zh. Mikrobiol. Epidemiol. i Immunobiol. 33:10:121-126.

211. Kulagin, S.M.; Fedorova, N.I.; Belavskii, E.B.; Anashkina, L.Ia.; Markarian, A.G. 1958. An outbreak of Q fever in the Yaroslavl oblast. Zh. Mikrobiol. Epidemiol. i Immunobiol. 29:2:44-51.

212. Kurek, C. 1958. Nowsze poglady na patogeneze rozcy w swietle badan wasnych. Med. Weter. 14:523-529.

213. Kuzell, W.C.; Makle, E.A. 1960. Cultivation of pleuropneumonia-like organisms in Reiter's disease, including one instance of laboratory cross infection. Ann. N.Y. Acad. Sci. 79:650-657.

214. Lambert, G.; Amerault, T.E.; Mantei, C.A.; Goode, E.R. 1960. Further studies on the persistence of Brucella abortus infection in cattle, p. 109-117. Proc. U.S. Livestock Sanitary Ass. 64th Annual Meeting, Oct. 1960.

215. Lancaster, J.E. 1963. Newcastle disease: Modes of spread. Vet. Bull. 33:221-226; 279-285.

216. Lattimer, J.K.; Wechsler, H.; Reilly, R.J.; Segawa, A.; Dushinski, L.M. 1965. Current developments in genitourinary tuberculosis. Trans. 24th Res. Conf. Pulmonary Dis. p. 29-30.

217. Law, L.W. 1965. Studies of experimental transmission of leukemogenic virus infection in mice. J. Nat. Cancer Inst. 34:543-549.

218. Law, L.W. 1966. Transmission studies of a leukemogenic virus, MLV, in mice. p. 267-285. In Marvin A. Rich and John B. Moloney (ed.). Conference on murine leukemia. Nat. Cancer Inst. Monogr. 22, Bethesda, Maryland.

219. LeChuiton, F.; Berge, C.; Pennaneach, J. 1935. Transmission experimentale au chat du typhus murin (Souche toulonnaise). Premieres considerations sur cette transmission. Presence du virus dans l'urine. Bull. Soc. Pathol. Exot. 28:685-688.

220. Lennette, E.H. 1948. Q fever in California. Calif. Med. 69:91-95.

221. Lennette, E.H. 1950. Cited by E.H. Lennette, In Newer knowledge of the older rickettsial diseases. Bacteriol. Rev. 14:249-258.

222. Lennette, E.H.; Clark, W.H. 1951. Observations on the epidemiology of Q fever in northern California. J. Amer. Med. Ass. 145:306-309.

223. Lepine, P.; Sautter, V. 1938. Contamination de laboratoire avec le virus de la choriomeningite lymphocytaire. Ann. Inst. Pasteur 61:519-526.

224. Lerner, A.M.; Klein, J.O.; Cherry, J.D.; Finland, M. 1963. New viral exanthems. New Engl. J. Med. 269:678-685, 736-740.

225. Levkovich, E.N.; Drobyshevskaia, A.I.; Chervyakov, M.P.; Neustroyev, V. 1941. Virological characteristics of individual outbreaks of tick-borne spring-summer encephalitis. Byul. Eksperim. Biol. i Med. 27:11:197.

226. Lewis, C.; Gray, J.E. 1961. Experimental Leptospira pomona infection in the mongolian gerbil (Meriones unguiculatus). J. Infect. Dis. 109:194-204.

227. Liess, B.; Plowright, W. 1964. Studies on the pathogenesis of rinderpest in experimental cattle: I. Correlation of clinical signs, viraemia, and virus excretion by various routes. J. Hyg. 62:81-100.

228. Littman, M.L.; Schneierson, S.S. 1959. Cryptococcus neoformans in pigeon excreta in New York City. Amer. J. Hyg. 69:45-59.

229. Long, E.R. 1951. The hazard of acquiring tuberculosis in the laboratory. Amer. J. Public Health 41:782-787.

230. Lubarsky, R.; Plunkett, O.A. 1954. Survival of C. immitis in passage through the digestive tract of mice. Public Health Rep. 69:494-497.

231. Lubashenko, S.; Novikova, L.S. 1947. Symptoms, diagnosis, specific prophylaxis and therapy of equine leptospirosis. Veterinariya 24:7-11.

232. Lurie, M.B. 1930. Experimental epidemiology of tuberculosis: The effect of eliminating exposure to enteric infection on the incidence and course of tuberculosis acquired by normal guinea pigs confined with tubercular cage mates. J. Exp. Med. 51:753-768.

233. Lurie, M.B. 1944. Experimental epidemiology of tuberculosis: Hereditary resistance to attack by tuberculosis and to the ensuing disease and the effect on the concentration of tubercle bacilli upon these two phases of resistance. J. Exp. Med. 79:573-589.

234. Lutsky, I.; Brodish, J. 1964. Experimental canine cryptococcosis. J. Infect. Dis. 114:273-276.

235. Maddy, K.T. 1962. The diagnosis of coccidioidomycosis, p. 396-408. Proc. 66th Annu. Meeting U.S. Livestock Sanit. Ass.

236. Mailloux, M.; Kolochine-Erber, B. 1961. Les Leptospiroses dans les anciens territoires de l'Union Francaise. Z. Tropenmed. Parasitol. 12:307-325.

237. Manson-Bahr, P.H. 1960. Manson's tropical diseases. 15th ed. Cassell & Co. Ltd., London. 1177 p.

238. Manthei, C.A. 1948. Research on swine brucellosis by the Bureau of Animal Industry (1941-1947). Amer. J. Vet. Res. 9:40-45.

239. Manthei, C.A.; Carter, R.W. 1950. Persistence of Brucella abortus infection in cattle. Amer. J. Vet. Res. 11:173-180.

240. Marcandies, A.; Pirot, R. 1934. Recherches sur la presence du virus du typhus murin (Souche toulonnaise) dans l'urine des rats et des cobayes. Arch. Inst. Pasteur (Tunis) 23:304-325.

241. Marchous, _.; Salembini, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

242. Mathis, C.; Cazanove, F.; Bacque, M. 1927. Inoculation de sang et d'urine de jauneux a des cobayes. Bull. Soc. Pathol. Exot. 20:1025-1038.

243. Mayants, A.I. 1946. Tularemia of the urinary bladder. Amer. Rev. Soviet Med. 3:360-361.

244. Mayr, A. 1962. The virus of Teschen disease. Ann. N.Y. Acad. Sci. 101:423-427.

245. McFerran, J.B.; Dow, C. 1964. The excretion of Aujeszky's disease virus by experimentally infected pigs. Res. Vet. Sci. 5:405-410.

246. McIntyre, W.I.M.; Seiler, H.E. 1953. Epidemiology of canicola fever. J. Hyg. 51:330-339.

247. Medearis, D.N., Jr. 1964. Observations concerning human cytomegalovirus infection and disease. Bull. Johns Hopkins Hosp. 114:181-211.

248. Medearis, D.N., Jr. 1964. Mouse cytomegalovirus infection. II. Observations during prolonged infection. Amer. J. Hyg. 80:103-112.

249. Medlar, E.M.; Sasano, K.T. 1944. Ingestion tuberculosis in normal and in vaccinated rabbits. Amer. Rev. Tuberc. 49:78-93.

250. Meier, F. 1959. Untersuchungen uber die Zeit des Verbleibs von infektiosem Maul-und-Klauenseuche-Virus in den Organen und seine Ausscheidung bei infizierten Schweinen. Monatsh. Tierheilk. 11:109-123.

251. Melnick, J.L. 1950. The poliomyelitis, encephalomyocarditis, and Coxsackie groups of viruses. Bacteriol. Rev. 14:233-244.

252. Melnick, J.L. 1951. Poliomyelitis and poliomyelitislike viruses of man and animals. Ann. Rev. Microbiol. 5:309-332.

253. Melnick, J.L.; Wenner, H.A.; Rosen, L. 1964. The enteroviruses, p. 194-242. In E.H. Lennette and N.J. Schmidt (ed.) Diagnostic procedures for viral and rickettsial diseases. 3rd ed. Amer. Public Health Ass., Inc., New York.

254. Meyer, H.M., Jr.; Hopps, H.E.; Rogers, N.G.; Brooks, B.E.; Bernheim, B.C.; Jones, W.P.; Nisalak, A.; Douglas, R.D. 1962. Studies on simian virus 40. J. Immunol. 88:796-806.

255. Meyer, K.F. 1932. A summary of recent studies on equine encephalomyelitis. Ann. Intern. Med. 6:645-654.

256. Meyer, K.F. 1957. The natural history of plague and psittacosis. Public Health Rep. 72:705-719.

257. Meyer, K.F.; Eddie, B. 1941. Laboratory infections due to brucella. J. Infect. Dis. 68:24-32.

258. Michaux, J.L.; Vandepitte, J.; Hennebert, P.N.; Sonnet, J. 1963. Aspects cliniques et therapeutiques de la cryptococcose chez le Bantou. A propos de trois cas traites par l'amphotericine B. Ann. Soc. Belge Med. Trop. 43:751-775.

259. Miller, W.R.; Pannell, L., Cravitz, L.; Tanner, W.A.; Ingalls, M.S. 1948. Studies on certain biological characteristics of Malleomyces mallei and Malleomyces pseudomallei: I. Morphology, cultivation, viability, and isolation from contaminated specimens. J. Bacteriol. 55:115-126.

260. Milzer, A. 1950. Routine laboratory diagnosis of virus and rickettsial diseases: Results of an eighteen month study. J. Amer. Med. Ass. 143:219-224.

261. Mims, C.A. 1956. Rift Valley fever in mice: I. General features of the infection. Brit. J. Exp. Pathol. 37:99-109.

262. Minervin, S.M. 1957. The results of many years observations in the study of botulism. Zh. Mikrobiol. Epidemiol. i Immunobiol. 28:10:30-35.

263. Minervin, S.M.; Kotlyarevskaya, Ye.N. 1937. The significance of nonspecific sensitization in the pathogenesis of botulism. Ann. Mechnikovskogo IN-TA 4:1:93. Cited by K.I. Matveev. 1949. The pathogenesis of botulism. Publ. House Acad. Med. Sci. USSR, Moscow. 271 p.

264. Minett, F.C. 1927. Second progress report on the foot-and-mouth disease research committee, p. 18, 34, 50. His Majesty's Stationery Office, London.

265. Minette, H.P.; Shaffer, M.F. 1968. Experimental leptospirosis in monkeys. Amer. J. Trop. Med. Hyg. 17:202-212.

266. Mirand, E.A. 1967. Transmission of some tumor viruses, p. 269-285. In Gerald Berg (ed.) Transmission of viruses by the water route. Interscience Publishers, New York, N.Y.

267. Misao, T.; Hiroyoshi, S.; Katsuta, K.; Nishihara, Y.; Kobayashi, Y.; Kuwashima, K.; Aso, M. 1956. Canicola fever in Japan. Amer. J. Hyg. 63:294-307.

268. Mitamura, T.; Kitaoka, M.; Watanabe, Z. 1939. Studies on the toxic substances secreted from the patients of Japanese encephalitis; mouth saliva, urine, feces. Tokyo Iji Shinshi 3143:1880-1883.

269. Moeschlin, S.; Koszewski, B.J. 1950. Komplikationen des Q-fever. Schweiz. Med. Wochensch. 80:929-931.

270. Moll, T.; Davis, A.D. 1959. Isolation and characterization of cytopathogenic enteroviruses from cattle with respiratory disease. Amer. J. Vet. Res. 20:27-32.

271. Mollet, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

272. Mollet, _.; Kirschfeld, _.; Dalrymple, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

273. Moltzen-Nielsen, H.; Plum, N. 1943. Tuberkulose hos hunden. Maanedsskr. Drylaeger. 54:201-213.

274. Moore, M.L.; Hooser, L.E.; Davis, E.V.; Siem, R.A. 1964. Sudden unexpected death in infancy: Isolations of ECHO type 7 virus. Proc. Soc. Exp. Biol. Med. 116:231-234.

275. Morse, E.V.; Kowalczyk, T.; Beach, B.A. 1951. The bacteriologic aspect of experimental brucellosis in dogs following oral exposure: I. Effects of feeding aborted fetuses and placentas to adult dogs. Amer. J. Vet. Res. 12:219-223.

276. Morse, E.V.; Erling, H.G.; Beach, B.A. 1951. Bacteriological aspects of experimental brucellosis in dogs following oral exposure: II. Effects of feeding brucella-infected milk to young dogs. Amer. J. Vet. Res. 12:324-325.

277. Muhlbock, O. 1950. Non-occurrence of mammary-tumor agent in the excreta of high-cancer-strain mice. Acta Physiol. Pharmacol. Neerl. 1:745-750.

278. Mukerjee, S.; Ghosh, S.N. 1962. Localization of cholera bacteriophage after intravenous injection. Ann. Biochem. Exp. Med. 22:73-76.

279. Mundel, B.; Gear, J. 1951. Rift Valley fever: I. The occurrence of human cases in Johannesburg. S. Afr. Med. J. 25:797-800.

280. Munro, W.T. 1939. Epidemiological aspects of pulmonary tuberculosis due to bovine type tubercle bacilli. Edinburgh Med. J. 46:165-179.

281. Neefe, J.R.; Stokes, J. 1945. An epidemic of infectious hepatitis apparently due to a water-borne agent: Epidemiologic observations and transmission experiments in human volunteers. J. Amer. Med. Ass. 128:1063-1075.

282. Nelson, J.B. 1952. Acute hepatitis associated with mouse leukemia: II. Etiology and host range of the causal agent in mice. J. Exp. Med. 96:303-312.

283. Newman, J.P. 1950. Studies of canine leptospirosis: I. Evaluation of laboratory diagnostic procedures; II. Serologic determination of the incidence of latent infection in the Lansing, Michigan area. Amer. J. Vet. Res. 11:405-411.

284. Nicol, C.S.; Edward, D.G. 1953. Role of organisms of the pleuropneumonia group in human genital infections. Brit. J. Vener. Dis. 29:141-150.

285. Nicolle, C.; Giroud, P.; Sparrow, H. 1934. Presence exceptionnelle du virus typhique murin dans les urines des rats infected experimentalement par ce virus. Arch. Inst. Pasteur (Tunis) 23:1-14.

286. Nicolle, M.; Adil-Bey, _. 1899. Etudes sur la peste bovine: Premier memoire. Ann. Inst. Pasteur 13:319-336.

287. Nikiforov, V.N. 1960. The cutaneous form of anthrax and bacteremia. Zh. Mikrobiol. Epidemiol. i Immunobiol. 31:8:122-128.

288. Nikiforov, V.N. 1960. Duration of discharge of Bacillus anthracis in skin anthrax treated by various methods. Zh. Mikrobiol. Epidemiol. i Immunobiol. 31:9:118-124.

289. Nilolaev, N.N. 1928. Concerning the enteric form of anthrax. Vrachebnoe Gazeta 32:2:99-104.

290. Noguchi, H. 1917. Spirochaeta icterohaemorrhagiae in American wild rats and its relation to the Japanese and European strains. First paper. J. Exp. Med. 25:755-763.

291. Noguchi, H. 1918. Morphological characteristics and nomenclature of Leptospira (Spirochaeta) icterohaemorrhagiae (Inada and Ido). J. Exp. Med. 27:575-592.

292. Notkins, A.L. 1965. Lactic dehydrogenase virus. Bacteriol. Rev. 29:143-160.

293. Notkins, A.L.; Scheele, C. 1963. Studies on the transmission and the excretion of the lactic dehydrogenase agent. J. Exp. Med. 118:7-12.

294. Notkins, A.L.; Scheele, C.; Scherp. H.W. 1964. Transmission of the lactic dehydrogenase agent in normal and partially edentulous mice. Nature 202:418-419.

295. Nussel, K. 1923. Ueber Tuberkelbazillenbefund im Stuhl. Muench. Med. Wochensch. 70:357-358.

296. Olitsky, P.K.; Casals, J. 1959. Arthropod-borne group A virus infections of man, p. 286-304. In T.M. Rivers and F.L. Horsfall, Jr. (ed.) Viral and rickettsial infections of man. 3rd ed. J.B. Lippincott Co., Philadelphia, Pennsylvania.

297. Oppermann, _. 1946. Cited by F. Hutyra, J. Marek, and R. Manninger. In J.R. Greig, J.R. Mohler, and A. Eichhorn (ed.) Special pathology and therapeutics of the diseases of domestic animals, Vol. I. 5th ed. Alexander Eger Inc., Chicago, Ill. 962 p.

298. Ozbil, M. 1955. Ein Beitrag zur Frage der Rickettsienausscheidung mit dem Urin. Z. Tropenmed. Parasitol. 6:453-459.

299. Page, L.A. 1959. Experimental ornithosis in turkeys. Avian Dis. 3:51-66.

300. Pappenheimer, A.M.; Kunz, L.J.; Richardson, S. 1951. Excretion of Coxsackie virus (Conn. No. 5 strain) in the urine of infected mice. Proc. Soc. Exp. Biol. Med. 77:405-407.

301. Parker, J.C.; Tennant, R.W.; Ward, T.G. 1966. Prevalence of viruses in mouse colonies, p. 25-36. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

302. Parker, R.R.; Steinhaus, E.A. 1943. American and Australian Q fevers: Persistence of the infectious agents in guinea pig tissues after defervescence. Public Health Rep. 58:523-527.

303. Parker, R.R.; Bell, E.J.; Lackman, D.B. 1948. Experimental studies of Q fever in cattle: I. Observations on four heifers and two milk cows. Amer. J. Hyg. 48:191-206.

304. Parker, R.R.; Steinhaus, E.A.; Kohls, G.M.; Jellison, W.L. 1951. Pasteurella tularensis and tularemia in beavers and muskrats in the northwestern United States. N.I.H. Bull. 193. 61 p.

305. Parkman, P.D.; Phillips, P.E.; Meyer, H.M., Jr. 1965. Experimental rubella virus infection in pregnant monkeys. Amer. J. Dis. Child. 110:390-407.

306. Parkman, P.D.; Phillips, P.E.; Kirschstein, R.L.; Meyer, H.M., Jr. 1965. Experimental rubella virus infection in the rhesus monkey. J. Immunol. 95:743-752.

307. Partridge, B.M.; Winner, H.I. 1965. Cryptococcus neoformans in bird droppings in London. Lancet 1:1060-1061.

308. Paul, J.R. 1957. Epidemiology of infectious hepatitis, p. 183-190. In F.W. Hartman, G.A. LoGrippo, J.G. Mateer, and J. Barrow (ed.) Hepatitis frontiers. Little, Brown and Company, Boston, Mass.

309. Pereira, H.G.; Huebner, R.J.; Ginsburg, H.S.; Van Der Veen, J. 1963. A short description of the adenovirus group. Virology 20:613-620.

310. Perla, D. 1927. Experimental epidemiology of tuberculosis. J. Exp. Med. 45:209-226.

311. Perla, D. 1927. Experimental epidemiology of tuberculosis: The elimination of tubercle bacilli in the feces, bile, and urine of infected guinea pigs. J. Exp. Med. 45:1025-1035.

312. Pertzelan, A.; Pruzanski, W. 1963. Leptospira canicola infection: Report of 81 cases and review of the literature. Amer. J. Trop. Med. Hyg. 12:75-81.

313. Petrov, Iu. K. 1956. Excretion of phage through the kidney of white mice and dogs, p. 143. In A.A. Smorodintsev (ed.) Problems of the pathogenesis and immunology of virus infections. Medzig, Leningrad.

314. Phillips, C.A.; Melnick, J.L.; Yow, M.D.; Bayatpour, M.; Burkhardt, M. 1965. Persistence of virus in infants with congenital rubella and in normal infants with a history of maternal rubella. J. Amer. Med. Ass. 193:1027-1029.

315. Phillips, G.B.; Jemski, J.V.; Brant, H.G. 1956. Cross infection among animals challenged with Bacillus anthracis. J. Infect. Dis. 99:222-226.

316. Pierce, E.C.; Pierce, J.D.; Hull, R.N. 1958. B virus: Its current significance. Description and diagnosis of a fatal human infection. Amer. J. Hyg. 68:242-250.

317. Pindak, M.A.; Clapper, W.E. 1964. Isolation of enteric cytopathogenic human orphan virus type 6 from dogs. Amer. J. Vet. Res. 25:52-54.

318. Plagemann, P.G.W.; Gregory, K.F.; Swin, H.E.; Chan, K.K.W. 1963. Plasma lactic dehydrogenase elevating agent of mice: Distribution in tissues and effects on lactic dehydrogenase isozyme patterns. Canad. J. Microbiol. 9:75-86.

319. Pogodina, V.V. 1960. Experimental study of the pathogenesis of tick-borne encephalitis on alimentary infection: II. Study of pathways of excretion of virus from white mice. Vop. Virusol. 5:279-285.

320. Pogodina, V.V. 1962. The course of alimentary infection and development of immunity in tick-borne encephalitis, p. 275-282. In E.H. Libikova (ed.) Biology of viruses of the tick-borne encephalitis complex. Proceedings of a symposium held at Smolenice, October 11-14, 1960. Czech. Acad. Sci., Praha.

321. Pollitzer, R. 1954. Plague. WHO Monogr. Ser. 22, 698 p.

322. Pollitzer, R. 1955. Cholera studies: 6. Pathology. Bull. WHO 13:1075-1199.

323. Polyakov, A.A. 1954. USSR work on transmission of veterinary infectious disease by rats. Veterinariya 31:8:44-46.

324. Pomales-Lebron, A. 1948. Studies on murine typhus in Puerto Rico. Puerto Rico J. Public Health Trop. Med. 23:393-407.

325. Pomanskaia, L.A. 1958. The multiple-passage technique in the study of tularemia. Zh. Mikrobiol. Epidemiol. i Immunobiol. 29:8:7-11.

326. Poppensiek, G.C.; Baker, J.A. 1951. Persistence of virus in urine as factor in spread of infectious hepatitis in dogs. Proc. Soc. Exp. Biol. Med. 77:279-281.

327. Prior, J.A.; Cole, C.R. 1951. Studies on the communicability of histoplasmosis. Amer. Rev. Tuberc. 63:538-546.

328. Quick, D.T.; Thompson, J.M.; Bond, J.O. 1965. The 1962 epidemic of St. Louis encephalitis in Florida: IV. Clinical features of cases occurring in the Tampa Bay area. Amer. J. Epidemiol. 81:415-427.

329. Quinn, R.W.; Hanson, R.P.; Brown, J.W.; Brandly, C.A. 1952. Newcastle disease virus in man: Results of studies in five cases. J. Lab. Clin. Med. 40:736-743.

330. Ramos-Alvarez, M.; Sabin, A.B. 1954. Characteristics of poliomyelitis and other enteric viruses recovered in tissue culture from healthy American children. Proc. Soc. Exp. Biol. Med. 87:655-661.

331. Ratner, S.I.; Korolev, G.P.; Gubin, G.N.; Komolova, R.P. 1956. A case of lingering foot-and-mouth disease in man. Klin. Med. (Moskva) 34:7:70-77.

332. Reeves, W.C.; Hammon, W.McD. 1962. Infection in other vertebrate hosts, p. 46-74. In C.E. Smith, W. Griffiths and W.C. Reeves (ed.) Epidemiology of the arthropod-borne viral encephalitides in Kern County, California, 1943-1952. University of California Publications in Public Health, Berkeley, California. 257 p.

333. Reid, J.D.; Scherer, J.H.; Herbut, P.A.; Irving, H. 1942. Systemic histoplasmosis diagnosed before death and produced experimentally in guinea pigs. J. Lab. Clin. Med. 27:419-434.

334. Reinhard, K.R. 1951. A clinical pathological study of experimental leptospirosis of calves. Amer. J. Vet. Res. 12:282-291.

335. Remlinger, R.; Bailly, J. 1936. Siege du virus dans l'encephalomyelite Argentine des equides (Maladie experimentale). Compt. Rend. Soc. Biol. 121:429-431.

336. Renoux, G. 1957. Brucellosis in goats and sheep. Advances Vet. Sci. 3:241-273.

337. Retnasabapathy, A. 1959. Melioidosis in pigs. J. Malay. Vet. Med. Ass. 2:121-124.

338. Riordan, J.T. 1943. Rectal tuberculosis in monkeys from the use of contaminated thermometers. J. Infect. Dis. 73:93-94.

339. Riordan, J.T.; Ledinko, N.; Melnick, J.L. 1952. Multiplication of poliomyelitis viruses in tissue cultures of monkey testes: II. Direct isolation and typing of strains from human stools and spinal cords in roller tubes. Amer. J. Hyg. 55:339-346.

340. Rivers, T.M.; Berry, G.P.; Sprunt, D.H. 1931. Psittacosis: I. Experimentally induced infections in parrots. J. Exp. Med. 54:91-103.

341. Robin, V.; Brion, A.; Cosson, Y. 1934. Sur l'elimination du B. de Koch par l'urine chez le chien tuberculeux. Bull. Acad. Vet. France 7:51-55.

342. Robinson, V.B.; McVickar, D.L. 1952. Pathology of spontaneous canine histoplasmosis: A study of twenty-one cases. Amer. J. Vet. Res. 13:214-219.

343. Rosen, L.; Abinanti, F.R. 1960. Natural and experimental infection of cattle with human types of reovirus. Amer. J. Hyg. 71:250-257.

344. Rosen, L.; Evans, H.E.; Spickard, A. 1963. Reovirus infections in human volunteers. Amer. J. Hyg. 77:29-37.

345. Rowe, W.P. 1961. The epidemiology of mouse polyoma virus infection. Bacteriol. Rev. 25:18-31.

346. Rowe, W.P.; Hartley, J.W. 1962. A general review of the adenoviruses. Ann. N.Y. Acad. Sci. 101:466-474.

347. Rowe, W.P.; Hartley, J.W.; Capps, W.I. 1963. Mouse hepatitis virus as a highly contagious, prevalent, enteric infection of mice. Proc. Soc. Exp. Biol. Med. 112:161-165.

348. Rowe, W.P.; Hartley, J.W.; Cramblett, H.G.; Mastrota, F.M. 1958. Detection of human salivary gland virus in the mouth and urine of children. Amer. J. Hyg. 67:57-65.

349. Rowe, W.P.; Hartley, J.W.; Brodsky, I.; Huebner, R.J.; Law, L.W. 1958. Observations on the spread of mouse polyoma virus infection. Nature 182:1617.

350. Sabin, A.B.; Ward, R. 1941. Poliomyelitis in a laboratory worker exposed to the virus. Science 94:113-114.

351. Sandiford, B.R.; Cayton, H.R.; Marks, J.; Mair, N.S.; Robinson, D.T.; Payne, D.J.H.; Hughes, X.E.A.; Robertson, L.; Henderson, R.J.; Tomlinson, A.J.H. 1962. The excretion of tubercle bacilli by experimentally infected guinea pigs. Monthly Bull. Min. Health (London) 21:228-234.

352. Satriano, S.F.; Luginbuhl, R.E.; Wallis, R.C.; Jungherr, E.L.; Williamson, L.A. 1958. Investigation of eastern equine encephalomyelitis: IV. Susceptibility and transmission studies with the virus of pheasant origin. Amer. J. Hyg. 67:21-34.

353. Sawers, W.C. 1938. Some aspects of the leptospirosis problem in Australia. Med. J. Australia 1:1089-1097.

354. Saxholm, R. 1956. Cultivation of M. tuberculosis from urine and gastric lavage by the pancreatin-quaternary ammonium compound method. Amer. Rev. Tuberc. 74:616-621.

355. Schaetz, F.; Buss, W. 1951. Ist eine Ubertragung der Brucellose (Abortus Bang) auf Rinder durch Ratten moglich? Monatsh. Prakt. Tierheilk. 3:136-141.

356. Schalk, A.F.; Roderick, L.M.; Foust, H.L.; Harshfield, G.S. 1935. Avian tuberculosis: Collected studies. N. Dak. Agr. Exp. Sta. Tech. Bull. No. 279, p. 1-46.

357. Schiff, G.M.; Sever, J.L.; Huebner, R.J. 1963. Clinical and laboratory findings of experimental infection with rubella virus. Clin. Res. Proc. 11:296.

358. Schmidt, U.; Bindrich, H. 1957. Concerning the question of excretion and reproduction of the Newcastle disease virus after infection of immune hens. Acta Virol. 1:180-187.

359. Schneider, B.; Bengelsdorff, H.J. 1963. Untersuchungen uber Ausscheidung und Passierung eines MKS-Impfvirusstammes im Rahmen von Rinderversuchen. Zentralbl. Veterinaermed. Ser. B. 10:80-90.

360. Schultz, I. 1963. Biologic significance of viruria as studied with herpes simplex infection of mice. J. Lab. Clin. Med. 62:1013.

361. Schultz, I.; Flanagan, C.L. 1965. Viruria in dogs after injection of Coxsackie B-1 virus into a renal artery. J. Clin. Invest. 44:1953-1959.

362. Schultz, I.; Frohlich, E. 1965. Viruria and viraliquoria in the dog after intravenous injection of T5 bacteriophage. Proc. Soc. Exp. Biol. Med. 118:136-138.

363. Schultz, I.; Neva, F.A. 1965. Relationship between blood clearance and viruria after intravenous injection of mice and rats with bacteriophage and polioviruses. J. Immunol. 94:833-841.

364. Schultz, I.; Neva, F.A. 1966. Viruria in herpes simplex infection of mice. J. Immunol. 96:74-79.

365. Scott, G.R.; Rampton, C.S. 1961. Transmission of lapinized rinderpest virus by contact between rabbits. Nature 192:289.

366. Sellards, A.W.; Mathis, C. 1928. Experiences de transmission du virus amaril au Macacus rhesus. Conference Africaine de la Fievre Jaune, Dakar. p. 229-240.

367. Shepard, M.C. 1960. Recovery, propagation, and characteristics of T-strain PPLO isolated from human cases of nongonococcal urethritis. Ann. N.Y. Acad. Sci. 79:397-402.

368. Shinner, J.J. 1963. St. Louis encephalomyelitis. Arch. Pathol. 75:309-322.

369. Shishkina, O.I.; Smorodintsev, A.A. 1947. Mechanism for the natural and acquired immunity for influenza. VI. Spread of influenza virus in naturally immunized animals. Zh. Mikrobiol. Epidemiol. i Immunobiol. 2:5-14.

370. Shlyakhov, E.N. 1955. Anthrax. Sanit. Epidemiol. Sta. Medgiz, Moscow 3:261-270.

371. Shope, R.E. 1935. Experiments on the epidemiology of pseudo-rabies: I. Mode of transmission of the disease in swine and their possible role in its spread to cattle. J. Exp. Med. 62:85-99.

372. Shrewsbury, J.F.D.; Barson, J. 1937. The cultivation of Myco tuberculosis from human sputa. Brit. Med. J. 2:1154.

373. Shubladze, A.K. 1949. Pathogenesis of the spring-summer encephalitis. I. Distribution of the virus of the spring-summer encephalitis in the organism of the susceptible and refractory laboratory animals. Arkhiv Biol. Nauk 56:2:83-96.

374. Shubladze, A.K. 1940. Experimental material on the etiology of the autumnal form of encephalitis: Report I. Zh. Mikrobiol. Epidemiol. i Immunobiol. 12:8:29-35.

375. Shubladze, A.K.; Gaidmovich, S.Ya.; Gavriloo, V.I. 1959. A virological study of laboratory infections with Venezuelan equine encephalomyelitis. Vop. Virusol. 4:305-310.

376. Shull, H.J. 1953. Human histoplasmosis: A disease with protein manifestations often with digestive system involvement. Gastroenterology 25:582-595.

377. Sidwell, R.W.; Thorpe, B.D.; Gebhardt, L.P. 1964. Studies of latent Q fever infections: I. Effects of whole body X-irradiation upon latently infected guinea pigs, white mice, and deer mice. Amer. J. Hyg. 79:113-124.

378. Siegert, R.; Simrock, W.; Stroder, U. 1950. Uber einen epidemischen Ausbruch von Q-Fieber in einem Krankenhaus. Z. Tropenmed. Parasitol. 2:1-40.

379. Simmons, J.S.; St. John, J.H.; Reynolds, F.H.K. 1931. Experimental studies of dengue: Cultivation experiments with the virus of dengue. Philippine J. Sci. 44:83-94.

380. Smadel, J.E. 1951. The hazard of acquiring virus and rickettsial diseases in the laboratory. Amer. J. Public Health 41:788-795.

381. Smith, H. 1948. Coccidioidomycosis in animals with report of a new case in a dog. Amer. J. Pathol. 24:223-233.

382. Smorodintsev, A.A. 1940. The spring-summer tickborne encephalitis. Arch. Ges. Virusforsch. 1:468-480.

383. Smorodintsev, A.A. 1942. Advances of the Soviet microbiologists in the study of the virus of encephalitis and of the grippe. Zh. Mikrobiol. Epidemiol. i Immunobiol. 14:12:61-69.

384. Smorodinstsev, A.A. 1957. A critical examination on the views of L.A. Zil'ber on the protective role of the processes of excretion of viruses through the kidneys. Probl. Virol. 2:53-59.

385. Smorodintsev, A.A.; Ostrovskaya, S.M. 1937. The distribution of influenza virus in experimentally infected mice. J. Pathol. Bacteriol. 44:559-566.

386. Smorodintsev, A.A.; Shishkina, O.I. 1946. Mechanism of acquired and active immunity in influenza infection. V. The dynamics of influenza virus in the immune animal. Zh. Mikrobiol. Epidemiol. i Immunobiol. 3:26-37.

387. Smorodintsev, A.A.; Chudakov, V.G.; Churilov, A.V. 1959. Haemorrhagic nephroso-nephritis. Pergamon Press, New York. 124 p.

388. Smorodinstsev, A.A.; Drobyshevskaia, A.I.; Ostrovskaia, S.M.; Shishkina, O.I. 1937. Experimental data on etiology of influenza virus. Sov. Vrach. Zh. 41:6:403-420.

389. Smorodinstsev, A.A.; Ostrovskaia, S.M.; Drobyshevskaia, A.I. 1938. Distribution of influenza virus in the organism of susceptible animals. Arkhiv Biol. Nauk 52:1:32-46.

390. Stanton, A.T.; Fletcher, W. 1932. Melioidosis: Studies from the Institute for Medical Research Federated Malay States. No. 21, p. 1-60. John Bale, Sons and Danielsson Ltd., London.

391. Stein, C.D. 1947. Some observations on the tenacity of Bacillus anthracis. Vet. Med. 42:13-22.

392. Stein, C.D. 1963. Anthrax, p. 82-125. In T.G. Hull (ed.) Diseases transmitted from animals to man. 5th ed. Charles C. Thomas, Springfield, Ill.

393. Stempien, R. 1966. Distribution and excretion of iodine-labeled staphylococcal enterotoxin in rabbits. Med. Dosw. Mikrobiol. 18:295-303.

394. Stoenner, H.G.; Maclean, D. 1958. Leptospirosis (Ballum) contracted from swiss albino mice. Amer. Med. Ass. Arch. Intern. Med. 191:606-610.

395. Stoker, M.G.P.; Brown, R.D.; Kett, F.J.L.; Collins, P.C.; Marmion, B.P. 1955. Q fever in Britain: Isolation of Rickettsia burneti from placenta and wool of sheep in an endemic area. J. Hyg. 53:313-321.

396. Stokes, A.; Bauer, J.H.; Hudson, N.P. 1928. Experimental transmission of yellow fever to laboratory animals. Amer. J. Trop. Med. 8:103-164.

397. Sydiskis, R.J.; Schultz, I. 1965. Herpes simplex skin infection in mice. J. Infect. Dis. 115:237-246.

398. Syrucek, L.; Raska, K. 1956. Q fever in domestic and wild birds. Bull. WHO 15:329-337.

399. Syrucek, L.; Sobeslavsky, O. 1956. Experimental infection in rats (Rattus norvegicus) with C. burneti. Cesk. Epidemiol. Mikrobiol. Immunol. 5:251-254.

400. Syrucek, L.; Raska, K.; Sobeslavsky, O. 1963. The importance of birds on epidemiology of Q fever. Proc. 7th Int. Cong. Trop. Med. Malaria 3:271-272.

401. Tasker, J.B.; Miesse, M.L.; Berge, T.O. 1962. Studies on the virus of Venezuelan equine encephalomyelitis: III. Distribution in tissues of experimentally infected mice. Amer. J. Trop. Med. Hyg. 11:844-850.

402. Taylor, T.J., Calnek, B.W. 1962. Isolation and classification of avian enteric cytopathogenic agents. Avian Dis. 6:51-58.

403. Taylor, R.E. 1954. Infectious abortion other than brucellosis. Auburn Vet. 10:117-124.

404. Taylor, R.M. 1951. Epidemiology, p. 427-538. In G.K. Strode (ed.) Yellow fever. McGraw-Hill Book Co. Inc., New York.

405. Taylor, R.M.; Lisbonne, M.; Vidal, L.F.; Hazemann, R.H. 1938. Quelques notes epidemiologiques sur l'infection des chevres et des brebis par Br. melitensis. Rev. Med. Vet. (Toulouse) 90:188-205.

406. Taylor, R.M.; Lisbonne, M.; Vidal, L.F.; Hazemann, R.H. 1938. Investigations on undulant fever in France. League of Nations Bull. Health Organ. 7:503-545.

407. Taylor-Robinson, D. 1963. Laboratory and volunteer studies on some viruses isolated from common colds (Rhinoviruses). Amer. Rev. Resp. Dis. 88:262-268.

408. Taylor-Robinson, D.; Tyrrell, D.A.J. 1962. Serotypes of viruses (Rhinoviruses) isolated from common colds. Lancet 1:452-454.

409. Tenbroeck, C.; Hurst, E.W.; Traub, E. 1935. Epidemiology of equine encephalomyelitis in the eastern United States. J. Exp. Med. 62:677-685.

410. Tennant, R.W.; Parker, J.C.; Ward, T.G. 1966. Respiratory virus infections of mice, p. 93-104. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

411. Theiler, M.; Gard, S. 1940. Encephalomyelitis of mice. III. Epidemiology. J. Exp. Med. 72:79-90.

412. Theiler, M. 1930. Studies on the action of yellow fever virus in mice. Ann. Trop. Med. 24:249-272.

413. Theiler, M. 1951. The virus, p. 39-136. In G.K. Strode (ed.) Yellow fever. McGraw-Hill Book Co. Inc., New York.

414. Thomsen, A. 1934. Brucella infection in swine: Studies from an epizootic in Denmark 1929-1932. Acta Pathol. Microbiol. Scand. Suppl. 21:1-253.

415. Thomsett, L.R. 1964. Diseases transmitted to man by dogs and cats. Can. J. Comp. Med. 28:66-72.

416. Thorpe, B.D.; Sidwell, R.W.; Johnson, D.E.; Smart, K.L.; Parker, D.D. 1965. Tularemia in the wildlife and livestock of the Great Salt Lake desert region, 1951 through 1964. Amer. J. Trop. Med. Hyg. 14:622-637.

417. Toomey, J.A. 1932. Demonstration of a toxic factor in the stools and urine of poliomyelitis patients. J. Prev Med. 6:379-386.

418. Traub, E. 1936. The epidemiology of lymphocytic choriomeningitis in white mice. J. Exp. Med. 64:183-200.

419. Traub, E. 1939. Epidemiology of lymphocytic choriomeningitis in a mouse stock observed for four years. J. Exp. Med. 69:801-817.

420. Traub, E.; Kesting, F. 1956. Ueber die Ausscheidung des E.E.E.-Virus und das gelegentliche Vorkommen von Kontaktinfektionen bestimmter Art bei Mausen. Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 166:462-475.

421. Tully, J.G.; Gaines, S.; Tigertt, W.D. 1963. Studies on infection and immunity in experimental typhoid fever: V. Respiratory challenge of chimpanzees with Salmonella typhosa. J. Infect. Dis. 113:131-138.

422. Tumanskiy, V.M. 1958. Microbiology of plague. Medgiz, Moscow. 268 p.

423. Tyrrell, D.A.J.; Chanock, R.M. 1963. Rhinoviruses: A description. Science 141:152-153.

424. Utz, J.P. 1960. Animal kidney infection by viruses isolated from human urine. J. Clin. Invest. 39:1037.

425. Utz, J.P.; Shelekov, A.I. 1958. Coxsackie B virus infection: Presence of virus in blood, urine, and cerebrospinal fluid. J. Amer. Med. Ass. 168:264-267.

426. Utz, J.P.; Szwed, C.F. 1962. Clinical and laboratory studies of mumps: III. Comparison of methods for detection of viruria. Proc. Soc. Exp. Biol. Med. 110:841-844.

427. Utz, J.P., [illegible], V.N.; Alling, D.W. 1964. Clinical and laboratory studies of mumps: IV. Viruria and abnormal renal function. New Engl. J. Med. 270:1283-1286.

428. Utz, J.P.; Szwed, C.F.; Kasel, J.A. 1958. Clinical and laboratory studies of mumps: II. Detection and duration of excretion of virus in urine. Proc. Soc. Exp. Biol. Med. 99:259-261.

429. Utz, J.P.; Kasel, J.A.; Cramblett, H.G.; Szwed, C.F.; Parrott, R.H. 1957. Clinical and laboratory studies of mumps: I. Laboratory diagnosis by tissue-culture technics. New Engl. J. Med. 257:497-502.

430. Vaishnav, V.P.; Jhala, C.I. 1963. Urinary tract infection: Bacteriological and laboratory methods of diagnosis. Indian J. Pathol. Bacteriol. 6:186-200.

431. Vallee, H.; Caire, H. 1922. Sur la contagiosite de la fievre aphteuse. Compt. Rend. 175:292-294.

432. Van den Ende, M.; Harries, E.H.R.; Stuart-Harris, C.H.; Steigman, A.J. 1943. Laboratory infection with murine typhus. Lancet 1:328-332.

433. Vanella, J.M.; Kissling, R.E.; Chamberlain, R.W. 1955. Transmission studies with encephalomyocarditis virus. J. Infect. Dis. 98:98-102.

434. Vargosko, A.J.; Kim, H.W., Parrott, R.H.; Jeffries, B.C.; Wong, D.; Chanock, R.M. 1965. Recovery and identification of adenovirus in infections of infants and children. Bacteriol. Rev. 29:487-495.

435. Verlinde, J.D.; Boer, H.D. 1948. Animal experiments on infectious hepatitis. Arch. Ges. Virusforsch. 4:1-23.

436. Versilova, P.A. 1937. The excretion of brucella in milk, urine, and vaginal secretion under conditions of natural and experimental infection of sheep, p. 95-105. In Brucellosis in sheep (in Russian). Viem. Publ. Dep., Moscow.

437. Vesenjak-Zmijanac, J.; Bedjanic, M.; Rus, S.; Kmet, J. 1955. Virus meningo-encephalitis in Slovenia: 3. Isolation of the causative agent. Bull. WHO 12:513-520.

438. Voros, S.; Pump, K.; Kelemen, G.; Polgar, F. 1964. Virus excretion and bacteriological studies in sporadic infantile enteritis. Acta Paediat. Acad. Sci. Hung. 5:113-120.

439. Waldman, O.; Trautwein, K.; Pyl, G. 1931. Die Persistenz des Maul-und-Klauenseuchevirus im Korper durchgeseuchter Tiere und Ausscheidung. Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 121:19-32.

440. Ward, R.; Krugman, S.; Giles, J.P.; Jacobs, A.M.; Bodansky, O. 1958. Infectious hepatitis: Studies of its natural history and prevention. New Engl. J. Med. 258:407-416.

441. Warren, J. 1959. Infections of minor importance, p. 896-924. In T.M. Rivers and F.L. Horsfall, Jr. (ed.) Viral and rickettsial infections of man. 3rd ed. J.B. Lippincott Company, Philadelphia, Pennsylvania.

442. Webb, P.A.; Johnson, K.M.; MacKenzie, R.B.; Kuns, M.L. 1967. Some characteristics of machupo virus, causative agent of Bolivian hemorrhagic fever. Amer. J. Trop. Med. Hyg. 16:531-538.

443. Weissflog, H. 1952. Untersuchungen uber das Vorkommen von Leptospirose bei Katzen im Gebiet der Hansestadt Hamburg. Berlin. Muench. Tieraerztl. Wochensch. 65:124-126.

444. Weller, T.H.; Neva, F.A. 1962. Propagation in tissue culture of cytopathic agents from patients with rubella-like illness. Proc. Soc. Exp. Biol. Med. 111:215-225.

445. Weller, T.H.; Macauley, J.C.; Craig, J.M.; Wirth, P. 1957. Isolation of intranuclear inclusion producing agents from infants with illnesses resembling cytomegalic inclusion disease. Proc. Soc. Exptl. Biol. Med. 94:4-12.

446. Welsh, H.H.; Lennette, E.H.; Abinanti, F.R.; Winn, J.F. 1958. Air-borne transmission of Q fever: The role of parturition in the generation of infective aerosols. Ann. N.Y. Acad. Sci. 70:528-540.

447. Weyrauch, H.M.; Norman, F.W.; Bassett, J.B. 1950. Coccidioidomycosis of the genital tract. Calif. Med. 72:465-468.

448. White, F.H.; Ristic, M. 1959. Detection of Leptospira pomona in guinea pig and bovine urine with fluorescein-labeled antibody. J. Infect. Diseases 105:118-123.

449. Wiesmann, E. 1952. Die Q-fever-Forschung in der Schweiz in den Jahren 1947-1951. Z. Tropenmed. Parasitol. 3:297-301.

450. Williams, R.S.; Hoy, W.A. 1927. Tubercle bacilli in the feces of apparently healthy cows. J. Hyg. 27:37-39.

451. Williams, R.S.; Hoy, W.A. 1930. The viability of B. tuberculosis (Bovinus) on pasture land, in stored feces, and in liquid measure: I. The viability of B. tuberculosis on pasture land. J. Hyg. 30:413-419.

452. Wilner, B.I. 1965. A classification of the major groups of human and other animal viruses, 3rd ed. Burgess Publishing Co., Minneapolis, Minn.

453. Winn, J.F.; Palmer, D.F. 1961. Recovery of western equine encephalomyelitis virus from crop washings of experimentally infected pigeons. Amer. J. Vet. Res. 22:139-141.

454. Winn, J.F.; Abinanti, F.R.; Lennette, E.H.; Welsh, H.H. 1961. Q fever studies: XXII. Inoculation of sheep by the intestinal route. Amer. J. Hyg. 73:105-113.

455. Wisseman, C.L., Jr. 1964. Rickettsial diseases, p. 798-821. In F.H. Top (ed.) Communicable and infectious diseases: Diagnosis, prevention, treatment. 5th ed. C.V. Mosby Co., St. Louis, Mo.

456. Wolff, J.W.; Bohlander, H.; Ruys, A.C. 1949. Researches on leptospirosis hallum: The detection of urinary carriers in laboratory mice. Antonie van Leeuwenhoek 15:1-13.

457. Wollnitza, E. 1938. Beitrag zur Frage der Vaccinia generalisata und Nachweis des Virus im Urin. Arch. Dermatol. Syph. 177:186-209.

458. Wood, R.L. 1966. Routes of elimination of Erysipelothrix insidiosa from infected swine. M.S. Thesis, Iowa State University, Ames, Iowa.

459. Woods, W.A.; Robbins, F.C.; Weiss, R.A.; Cashel, J.; Kirschstein, R.L. 1964. Characteristics of Sabin type 1 poliovirus after gastrointestinal passage in newborn infants: II. Antigenicity and elution from $Al(OH)_3$ gel. Amer. J. Hyg. 79:236-244.

460. World Health Organization. 1950. Joint OIHP/WHO study group on African rickettsioses. Report on the first session. WHO Tech. Rep. Ser. 23.

461. World Health Organization. 1951. Joint FAO/WHO expert panel on brucellosis. Report on the first session. WHO Tech. Rep. Ser. 37.

462. World Health Organization. 1959. Joint WHO/FAO expert committee on zoonoses. Second Report. WHO Tech. Rep. Ser. 169.

463. World Health Organization. 1964. Joint FAO/WHO expert committee on brucellosis. Fourth Report. WHO Tech. Rep. Ser. 289.

464. Worth, C.B.; Richard, E.R. 1951. Transmission of murine typhus in roof rats in the absence of ectoparasites. Amer. J. Trop. Med. 31:301-305.

465. Yager, R.H. 1953. Leptospirosis in the United States today: Symposium on the leptospiroses. Med. Serv. Publ. No. 1. U.S. Government Printing Office, Washington, D.C.

466. Yankovsky, A.K.; Povalishina, T.P.; Vlasov, A.S.; Kozhushko, M.I.; Sadovskaya, E.V. 1963. Evidence on the natural foci of hemorrhagic fever with a renal syndrome in the Moscow region. Zh. Mikrobiol. Epidemiol. i Immunobiol. 40:12:46-51.

467. Yevdoshenko, V.G.; Kichatov, E.A.; Proreshnaya, T.L. 1961. Experimental study of possible pathways of infection of susliks and their excretion into the external environment of the agent Q fever. Probl. Virol. 6:380-384.

468. Yuill, T. 1964. Viral and parasitic infections of a population of snowshoe hares in Alberta. Doctoral thesis. University of Wisconsin, Madison.

469. Zakharov, V.V. 1962. Clinical aspects and medical treatment of coccidioidomycosis. Vestn. Dermatol. i Venerol. 36:74-77.

470. Zakstel'skaia, L.Ia. 1953. Virus emission in the urine of patients of epidemic influenza. Trudy Inst. Akad. Med. Nauk SSSR Moscow. 72 p.

471. Zaporozhchenko, A.Ya. 1959. Epidemiology of rarely encountered clinical forms of anthrax. Vrachebnoe Delo 11:1205-1205.

472. Zia, S.H.; Wang, F.L. 1949. Brucellosis in North China: A clinical, etiological, and epidemiological study. Amer. J. Trop. Med. 29:925-936.

473. Zil'ber, L.A. 1957. Reply to A.A. Smorodinstsev. Probl. Virol. 2:59-61.

474. Zil'ber, L.A.; Soloviev, V.D. 1946. Far eastern tick-borne spring-summer (spring) encephalitis. Amer. Rev. Soviet Med. (Spec. Suppl.) p. 6-80.

475. Zoletto, R.; Dovadola, E. 1964. Teschen disease in Italy: III. Isolation of a virus of Teschen disease and other enteric viruses from healthy swine. Veterinaria Ital. 15:10-15.

476. Zwart, D.; Macadam, I. 1967. Transmission of rinderpest by contact from cattle to sheep and goats. Res. Vet. Sci. 8:37-47.

TABLE 4. INFECTION OF UNINOCULATED CONTROL ANIMALS CAGED WITH OR NEAR INOCULATED ANIMALS

Disease or Causative Agent	Animals	Method of Inoculation: Aerosol Exposure: Whole Body	Aerosol Exposure: Head Only	Aerosol Exposure: Nose & Mouth	IP	SC	IV	IM	Other (IN,IT,Oral,IC,ID,FF,ICar, IO,IL)	Literature Cited
Adenovirus	Mice	-	-	-	0#b/; +#c/	-	-	-	+#ICc/; 0#ICb/; +#INc/	59
African swine fever	Swine	-	-	-	-	-	-	-	0#ISc/	61
Aleutian disease	Mink	-	-	-	-	-	-	-	++bc/	5
Anthrax	Guinea pigs	+#	-	+d/	0#	0#b/; 0*c/	-	0#b/; 0*c/	-	33,78,120,g/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	*c/	0*c/	-	78,120,g/
Apes	Monkeys	-	-	-	-	0*	-	-	-	5
Avian lymphomatosis	Chickens	-		-	+*b/; 0bdu/	+bcd/	cd/; +bcd/	+cd/; +bcd/	+#IObc ; +Oral bcd/	15,19,20,39,[illegible]
Botulinum toxin	Guinea pigs	0#bu/		-	-	-	-	-	+#Oral; 0*e/	8
Brucellosis	Chickens	-		-	-	-	-	+#	-	[illegible]
	Guinea pigs	+#; 0#s/		-	0#c/	0*c/	-	-	0* Oralc	42,+2 121
	Mice	0#s/		-	0#bc/	0#bc/	-	0#bc/	0#INbc/	120,g
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	*c/	0*c/	-	g
	Swine	-	-	-	-	-	+#	-	+#IO	[illegible]
Caraparu	Monkeys	-		-	-	0*	-	-	-	5
Coccidioidomycosis	Dogs	-		-	-	-	-	-	0#IT	[illegible]
	Guinea pigs	-	0#bc/;	0#k/	0d/	-	-	-	0*IT; 0dc	5/,71 127,1[illegible]
	Monkeys 1/	+*abc/	0*	-	0*c/	0*cv/	0*c/	0*c/	-	23,21 25,82
Eastern equine encephalitis	Chickens	-	-	-	-	+#	-	-	-	22
	Mice	-	-	-	-	-	-	-	0#ICc/; 0#ICm/; +#ICp	159
	Pheasants	-	-	-	-	0#b/; +*	-	0#b/; +#c/	-	65,137
	Swine	-	-	-	-	-	0#	-	0#IC, ID, IN	[illegible]
Epidemic diarrhea	Mice	-	-	-	-	-	-	-	+#Oral b/; +l/; +#Oral bm/; 0#Oral bmt/	72,81,136
Foot-and-mouth disease	Cattle	-	-	-	-	-	-	-	+#ILb/	51
Friend's virus	Mice	-	-	-	0#cd/; Ocd/	-	-	-	-	23,104
Herpes simplex	Monkeys	-	-	-	-	-	-	-	-IObd/	77
Histoplasmosis	Dogs	-	-	-	-	-	-	-	+#bl/	125
	Guinea pigs	0#bcs/	-	0d/	0#b/; 0*c/	0#b/; 0*c/	-	0#b/; 0*c/	-	89,g/
	Mice	0#b/	-	-	0#bc/	0#bc/	-	0#bc/	0#INbc/	53,63 g/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	g/
Hog cholera	Swine	-	-	+#b/	-	-	-	-	-	139,141
Infectious bronchitis	Chickens	-	-	-	-	-	-	-	+#IT; +dl/	44,113

Influenza	Dogs	-		0#c/	-	-	-	-	-	3
	Ferrets	-		-	-	+cd/	-	-	-	147
	Mice	+*c/; +*b/	0#b/; -#c/	+#c/	0#b/; +#c/	0#bc/	-	0#bc/	+#IN$_c$/; 0#IN$_b$/	40,64,137,138,x/
	Swine	+#f/	-	-	-	-	-	-	-	38
Itaqui	Monkeys	-	-	-	-	0*	-	-	-	5
Japanese B encephalitis	Mice	0#bcx/	0#bcx/	-	0#b/	0#b/	0#b/	0#b/	0#IC,IN; 0#Oral b/	x/, x/
	Monkeys	0*bcx/	0*bcx/	-	-	-	-	-	-	x/
Junin	Guinea pigs	-	-	-	-	-	-	+d/; 0bd/	-	31
Lactic dehydrogenase	Mice	-	-	-	+bo/; +cd/	+bn/; +cd/; 0bd/	-	-	-	28,110,111
Leptospirosis	Monkeys	-	-	-	0*b/	-	-	-	-	103
Lethal intestinal virus	Mice	-	-	-	-	-	-	-	+#Oral bn/; 0#Oral bnx/	11
Louping ill	Mice	-	-	-	-	-	-	-	+IC^{d}/	6
Lymphocytic choriomeningitis	Hamsters	-	-	-	+b/	-	-	-	-	90
	Mice to guinea pigs	-	-	-	-	-	-	-	+bde/	160
	Mice	-	-	-	-	-	+#c/	-	+IC,IN$_d$/; +#IC,IN$_c$/; +#c1/	157,158,160
Machupo	Hamsters	-	-	-	+d/	-	-	-	+#IC$_{cm}$/; +IC$_d$/	74,75
Marek's disease	Chickens	-	-	-	+#bc/	-	-	-	-	12
Marituba	Monkeys	-	-	-	-	0*	-	-	-	5
Measles	Monkeys	-	-	-	-	-	-	-	+b1/	123
Melioidosis	Hamsters	0#a/	-	-	+#o/	-	-	-	+#IN$_c$/	126,x/
Meningopneumonitis	Mice	0#a/	-	-	-	-	-	-	-	126
Moloney leukemogenic virus	Mice	-	-	-	-	0cd/	-	-	0d1/	86,87,88
Monkey 3	Monkey to rabbits	0b/	-	-	-	-	-	-	-	24,x/
	Monkeys	+*bcx/	+*cx/; +*... /	-	-	-	-	-	-	x/
	Rabbits	+#c/	-	-	-	0#c/	-	-	0#IN; +#IO$_c$/	24,x/
Monkey pox	Monkeys	-	-	-	-	-	-	+bd/	+*b1/; +#b1/; +c1/	x/,134,161,162
Mouse hepatitis	Mice	-	-	-	+#br/	-	-	-	-	106,129
Mouse pox	Mice	-	-	-	-	-	-	-	+#FP$_c$/; +#IN$_c$/; +#ch/	17,48,49,50
Murutucu	Monkeys	-	-	-	-	0*	-	-	-	5
Mycoplasmosis	Chickens	-	-	-	-	-	-	-	0#FP$_x$/; +#FP$_c$/; +d1/; +IN$_{bcd}$/; +*b1/	45,84,113,166
	Mice	-	-	-	-	-	-	-	+IN$_{cd}$/	107,108
	Rats	-	-	-	-	-	-	-	+IN$_{cd}$/; +#IN$_c$/; 0#IN$_b$/	107,108,164
	Turkeys	-	-	-	-	-	-	0#c/	0#FP$_c$/; +#IT$_c$/; +IT$_{cd}$/; +IN$_{cd}$/	2,73,165,166

Causative Agent of	Animals	Method of Inoculation: Aerosol Exposure: Whole Body	Aerosol Exposure: Head Only	Aerosol Exposure: Nose & Mouth	IP	SC	IV	IM	Other (IN,IT,Oral,IC,ID,FP,ICar, IO,IL)	Literature Cited
Newcastle disease	Chickens	+#bc/; 0#btu/	+bd/	-	0#b/; +#c/	0#b/; +#c/	-	0#b/; +#c/	0#btu/,0*b/,+#bc/,+*c/IT; +#IO,IN,bc/	7,8,98,144,z/
Ornithosis	Turkeys	-	-	-	+#	-	-	-	+#IT,Oral; +#bf/	116
Oriboca	Monkeys	-	-	-	-	0*	-	-	-	5
Parainfluenza	Hamsters	-	-	-	-	-	-	-	0#INbt/	66
	Lambs	-	-	-	-	-	-	-	0#INb/	26
Plague	Guinea pigs	+#	-	+#	0#bc/	0d/; 0#c/	-	0#bc/	+#INc/; 0#INb/; 0#INc/	34,78,80,156,z/
	Marmots	-	-	+bd/	-	-	-	-	-	41
	Mice, kangaroo rats	+#cs/; 0#bs/	-	-	0#b/; +#c/	0#b/; 0d/; +#c/	-	0#bc/	+#INc/; 0#INb/	80,156,z/
	Monkeys	+#	-	-	-	-	-	-	+*ITbc/	z/,96,97
Pneumonia virus of mice	Mice	-	-	-	-	-	-	-	0#INb/; +cl/	67,118
Poliomyelitis	Mice	-	-	-	-	-	-	-	+ICdq/	167
	Monkeys, chimpanzee	0*bcs/	0*bcs/	-	0*c/	0*c/	0*c/	0*c/	+IN,Oral bd/	27,43,68,z/
Polyoma disease	Hamsters	-	-	-	-	+dp/	-	-	-	122
	Mice	-	-	-	-	-	-	-	+dl/	128
Pseudorabies	Guinea pigs, mice, rabbits, rats, swine	-	-	-	-	+#v/	-	+#v/	0cd/	143
Psittacosis	Chickens	-	-	-	-	-	-	-	0 Oral d/	10
	Mice	0#s/	-	-	0*bc/	-	-	-	0*ICbc/	126,z/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	z/
Q fever	Cats	-	-	-	-	+d/	-	-	-	52
	Guinea pigs	+#	+#cstu/; 0#bstu/	-	0#bc/	0#bc/	-	0#bc/	0#INbc/	z/,89,z/
	Hamsters	-	-	-	0#bc/	-	-	-	-	1
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	z/
Rabbit pox	Rabbits	-	-	+#b/	-	-	-	-	+#INbc/; +#ch/	9,163
Rauscher virus	Mice	-	-	+#cs/	-	-	-	-	-	56
Reovirus	Mice	-	-	-	-	-	-	-	+cdh/	149
Rhinotracheitis	Cats	-	-	-	-	-	-	-	+#INc/	124
Rift Valley fever	Lambs	-	-	-	0#	-	-	-	-	37
	Mice	-	0#	-	0*#bc/	-	-	-	0*#ICbc/	z/,39,z/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	z/,102,z/

Rinderpest	Cattle	-	-	-	-	+#c/	-	-	+#INc/	91,169
	Cattle to goats	-	-	-	-	+#c/	-	-	+#INc/	169
	Cattle to sheep	-	-	-	-	+#c/	-	-	+#INc/	169
	Goats	-	-	-	-	-	-	-	+#ch/	169
	Rabbits	-	-	-	-	-	0d/	-	-	140
	Sheep	-	-	-	-	-	-	-	+#ch/	169
	Swine	-	-	-	-	-	-	-	0#g/	32
	Swine to cattle	-	-	-	-	-	-	-	0#g/	32
Rocky Mountain spotted fever	Guinea pigs	-	-	-	0#c/	0#c/	0*	-	0#IN,ICar	g/,4,g/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	131,132,g/
Rous sarcoma	Chickens	-	-	-	-	+#; 0b/	+#; 0b/	-	-	19,94
Rubella	Hamsters	-	-	-	-	-	-	-	0 INm/	115
	Monkeys	-	-	-	-	-	+bcd; +dm/	+cd/; 0bd/	0 INbcd/; 0 ICbcd/	70,119
Russian spring-summer encephalitis	Mice	-	-	-	-	-	-	-	+ICdo/	78
St. Louis encephalitis	Mice	-	-	-	0*#c/	-	-	-	0*#ICc/	g/
	Monkeys	-	-	-	0*c/	0*c/	0*c/	0*c/	-	g/
Scrapie	Mice	-	-	-	+#b/	-	-	-	+#ICb/; 0#ICb/	105,168
Semliki Forest virus	Hamsters	-	-	+#c/	-	-	-	-	-	60
Sendai	Mice	+#c/	-	-	-	-	-	-	+cdl/; +*cdl/	117,118,153
	Mice to guinea pigs	-	-	-	-	-	-	-	+bdl/	118
	Mice to rats	-	-	-	-	-	-	-	+bdl/	118
Simian virus 40	Monkeys	-	-	-	-	-	-	-	+*INc/	95
Soviet hemorrhagic fever	Voles, mice	-	-	-	-	-	-	-	+#l/	83
Theiler's virus	Mice	-	-	-	0cd/	-	-	-	0 ICcd/; +dm/	118,154,155
	Mice to guinea pigs	-	-	-	-	-	-	-	0 bdl/	154,155
Tuberculosis	Guinea pigs	+#bc/	+#cstu/; 0#bstu/	-	+#bc/	+cd/	-	+cd/	-	55,78,g/
	Mice	+#bcs/; 0#bu/; +#cu/	+#cu/; 0#bu/	-	0#b/; +#c/	-	+d/	0#b/; +#c/	+INcd/; 0 ICcd/	g/,55,g/
	Monkeys	+*bcs/	+*bcs/	-	-	-	-	-	+#l/	135,g/
	Rabbits	-	-	-	+#b/	-	-	-	-	92
Tularemia	Guinea pigs	+#bc/	0#	-	0#	0#	-	0#bc/	0#INbc/	g/,156,g/
	Mice	0#g/	-	-	0#; 0d/	0#; 0d/; +#i/	-	-	0 INd/	g/,93,114,126,156
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	g/
	Rats	-	-	-	-	0d/	-	-	-	156
Vaccinia	Mice	-	-	-	0#	0#	0#	-	0#IC,Oral,YF; +IDd/; 0 IDb/	g/,16
	Rabbits	-	-	-	-	-	-	-	+IDbd/	36

Causative Agent of	Animals	Method of Inoculation: Aerosol Exposure: Whole Body	Aerosol Exposure: Head Only	Aerosol Exposure: Nose & Mouth	IP	SC	IV	IM	Other (IN,IT,Oral,IC,ID,FP,ICar, IO,IL)	Literature Cited
Variola	Monkeys	-	0*	-	-	-	-	-	+*IN	57,109
Venezuelan equine encephalitis	Dogs	-	-	-	-	-	-	+#	-	29,152
	Guinea pigs	+#	+#cs/; 0#bs/	-	0#b/; 0*c/	-	-	0#b/; 0*c/	-	78,z/
	Horses	-	-	0#b/	-	+n/	-	-	-	79
	Mice	+#cs/; 0#bs/	-	-	+#b/; 0*bc/	0*	-	-	0*ICbc/; +#ICbc/	130,z/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	z/
	Pigeons	-	-	0#r/	-	-	-	-	-	99,100,101
Vesicular stomatitis	Mice	-	-	-	+dp/	-	-	-	+#IN	46,145
	Swine	-	-	-	-	-	+#	-	-	142
Western equine encephalitis	Chickens	-	-	-	-	+#	-	+#; 0b/	+#IC	14,22
	Snakes	-	-	-	-	0#c/	-	-	-	148
Yaba	Monkeys	-	0*cs/	-	-	-	-	-	-	56
Yellow fever	Mice	+#cs/; 0#bs/	-	-	0*#bc/	0*	-	-	0*#ICbc/	x/,z/
	Monkeys	+*abc/	+*abc/	-	0*c/	0*c/	0*c/	0*c/	-	102,z/

FP = foot pad, IC = intracerebral, ICar = intracardial, ID = intradermal, IL = intralingual, IM = intramuscular, IN = intranasal instillation, IO = intraocular, IP = intraperitoneal, IT = intratracheal, IV = intravenous, SC = subcutaneous

+ = Infection of control animals. - = No data known.
0 = No infection of control animals.
* = Infected and control cagemates in wire-bottomed or bar-bottomed cage that allowed urine and feces to drop through.
# = Solid-bottomed cages or pens.
a = But "0" if the monkey fur was forcibly air-washed by a manually manipulated air hose for 10 minutes.
b = Control animals in separate but adjacent cages.
c = Control animals in the same cage with the inoculated animals.
d = Unknown whether the cage had a solid bottom or a bottom that permitted urine and feces to drop through.
e = Method of inoculation not precisely stated.
f = Exposed to aerosols, method not stated.
g = Simultaneously infected intramuscularly and orally.
h = Control animals placed in cage or pen with animals infected by contact transmission.
i = In a tube, nose-to-nose in near contact with moribund mice.
j = Challenge by dry arthrospores.
k = Challenge by wet and dry fragmented mycelia.
l = Naturally infected animals caged with normal animals.
m = Mother inoculated; litter test animal.
n = Inoculated horse and control horse tied so that their heads could come in contact.
o = Infection due to cannibalism.
p = Mothers infected by inoculated sucklings.
q = Only 1 infected among 59 control cagemates.
r = But 1 of 6 controls was infected by viremic birds in an air-duct-connected cage.
s = Animals were air-washed for 5 to 15 minutes after microbial aerosol exposure.
t = 50 FG filter used.
u = UV radiation used.
v = Swine only.
w = Wheater, D.W.F., and Russell, W.; Unpublished results.
x = Experimental controls from various sources.
y = Except see Literature Cited number 21.
z = Experiments by Research Section, Research and Radiological Division, Industrial Health and Safety Directorate.

LITERATURE CITED FOR TABLE 4

1. Abinanti, F.R.; Lennette, E.H.; Winn, J.F.; Welsh, H.H. 1953. Q fever studies: XVIII. Presence of Coxiella burnetii in the birth fluids of naturally infected sheep. Amer. J. Hyg. 58:385-388.

2. Adler, H.E.; Sadler, W.W. 1965. Response of the turkey to Mycoplasma gallisepticum infection. Poultry Sci. 44:136-140.

3. Ado, A.D.; Titova, S.M. 1959. A study of experimental influenza in dogs. Vopr. Virusol. 2:165-169.

4. Aikawa, J.K. 1966. Rocky Mountain spotted fever. Charles C. Thomas, Springfield, Illinois. 140 p.

5. Allen, W.P.; Belman, S.G.; Borman, E.R. 1967. Group C arboviruses infections in rhesus monkeys. Amer. J. Trop. Med. Hyg. 16:106-110.

6. Alston, J.M.; Gibson, H.J. 1931. A note on experimental transmission of "louping ill" to mice. Brit. J. Exp. Pathol. 12:82-88.

7. Andrewes, C.H.; Allison, A.C. 1961. Newcastle disease as a model for studies of experimental epidemiology. J. Hyg. 59:285-293.

8. Barbeito, M.S.; Mathews, C.T.; Taylor, L.A. 1967. Microbiological laboratory hazard of bearded men. Appl. Microbiol. 15:899-906.

9. Bedson, H.S.; Duckworth, M.J. 1963. Rabbit pox: An experimental study of the pathways of infection in rabbits. J. Pathol. Bacteriol. 85:1-20.

10. Benedict, A.A.; McFarland, C. 1958. Newer methods for detection of avian ornithosis. Ann. N.Y. Acad. Sci. 70:501-515.

11. Biggers, D.C.; Kraft, L.M.; Sprinz, H. 1964. Lethal intestinal virus infection of mice (LIVIM): An important new model for study of the response of the intestinal mucosa to injury. Amer. J. Pathol. 45:413-422.

12. Biggs, P.M.; Payne, L.N. 1967. Studies on Marek's disease: I. Experimental transmission. J. Nat. Cancer Inst. 39:267-280.

13. Blundell, G.P.; Castleberry, M.W.; Lowe, E.P.; Converse, J.L. 1961. The pathology of Coccidioides immitis in the Macaca mulatta. Amer. J. Pathol. 39:613-630.

14. Bourke, A.T.C. 1964. Contact transmission of the Highlands J strain of western equine encephalomyelitis in chicks. Amer. J. Trop. Med. Hyg. 13:482-487.

15. Brewer, N.R.; Brownstein, B. 1946. The transmission of lymphomatosis in the fowl. Amer. J. Vet. Res. 7:123-128.

16. Briody, B.A. 1959. Response of mice to ectromelia and vaccinia viruses. Bacteriol. Rev. 23:61-95.

17. Briody, B.A. 1966. The natural history of mousepox, p. 105-116. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

18. Burmester, B.R. 1952. Studies on fowl lymphomatosis. Ann. N.Y. Acad. Sci. 54:992-1003.

19. Burmester, B.R.; Fontes, A.K.; Walter, W.G. 1960. Contact transmission of Rous sarcoma. J. Nat. Cancer Inst. 25:307-313.

20. Burmester, B.R.; Walter, W.G.; Gross, M.A.; Fontes, A.K. 1959. The oncogenic spectrum of two "pure" strains of avian leukosis. J. Nat. Cancer Inst. 23:277-291.

21. Castleberry, M.W.; Converse, J.L.; Del Favero, J.E. 1963. Coccidioides transmission to infant monkey from its mother. Arch. Pathol. 75:459-461.

22. Chamberlain, R.W.; Sikes, R.K.; Kissling, R.E. 1954. Use of chicks in eastern and western equine encephalitis studies. J. Immunol. 73:106-114.

23. Chamorro, A.; Latarjet, R.; Vigier, P.; Zajdela, F. 1962. New investigations on the Friend disease, p. 176-192. In G.E.W. Wolstenholme and M. O'Connor (ed.). Tumour viruses of murine origin. Ciba Foundation Symposium, Little, Brown and Co., Boston, Mass.

24. Chappel, W.A.; Easterday, B.C. 1960. Animal infectivity of aerosols of monkey B virus. Ann. N.Y. Acad. Sci. 85:931-934.

25. Converse, J.L.; Lowe, E.P.; Castleberry, M.W.; Blundell, G.P.; Bessemer, A.R. 1962. Pathogenesis of Coccidioides immitis in monkeys. J. Bacteriol. 83:871-878.

26. Cook, M.K.; Chanock, R.M. 1963. In vivo antigenic studies of parainfluenza viruses. Amer. J. Hyg. 77:150-159.

27. Craig, D.E. 1957. Contact transmission of poliomyelitis among monkeys. Bacteriol. Proc. p. 64.

28. Crispens, C.G., Jr. 1964. On the epizootiology of the lactic dehydrogenase agent. J. Nat. Cancer Inst. 32:497-505.

29. Davis, M.H.; Hogge, A.L., Jr.; Corristan, E.C.; Ferrell, J.F. 1966. Mosquito transmission of Venezuelan equine encephalomyelitis virus from experimentally infected dogs. Amer. J. Trop. Med. Hyg. 15:227-230.

30. Davis, O.S.; Doyle, L.P. 1949. Studies in avian leucosis: IV. Further transmission of visceral lymphomatosis. Amer. J. Vet. Res. 10:85-91.

31. DeGuerrero, L.B.; Boxaca, M.C.; Parodi, A.S. 1965. Fiebre hemorragica experimental en cobayos (Virus Junin). Contagio y eliminacion de virus. Rev. Asoc. Med. Argent. 79:271-274.

32. DeLay, P.D.; Moulton, W.M.; Stone, S.S. 1961. Survival of rinderpest virus in experimentally infected swine, p. 376-383. Proc. U.S. Livestock Sanitary Ass. 65th Annual Meeting, Oct-Nov 1961.

33. Druett, H.A.; Henderson, D.W.; Packman, L.; Peacock, S. 1953. Studies on respiratory infection: I. The influence of particle size on respiratory infection with anthrax spores. J. Hyg. 51:359-371.

34. Druett, H.A.; Robinson, J.M.; Henderson, D.W.; Packman, L.; Peacock, S. 1956. Studies on respiratory infection: II. Influence of aerosol particle size on infection of the guinea pig with Pasteurella pestis. J. Hyg. 54:37-48.

35. Dunlop, W.R.; Kottaridis, S.D.; Gallagher, J.R.; Smith, S.C.; Strout, R.G. 1965. The detection of acute avian leucosis as a contagious disease. Poultry Sci. 44:1537-1540.

36. Duran-Reynals, F. 1931. On the spontaneous immunization of rabbits to vaccine virus. J. Immunol. 20:389-391.

37. Easterday, B.C. 1961. Experimental Rift Valley fever. Doctoral Thesis. University of Wisconsin, Madison.

38. Easterday, B.C. 1965. Exposure of calves and pigs to aerosols of types A and B influenza viruses. U.S.P.H.S. Communicable Disease Center Zoonoses Surveillance, Report No. 5:17-18.

39. Easterday, B.C.; Murphy, L.C. 1963. Studies on Rift Valley fever in laboratory animals. Cornell Vet. 53:423-433.

40. Eaton, M.D. 1940. Transmission of epidemic influenza virus in mice by contact. J. Bacteriol. 39:229-241.

41. Eberson, F.; Teh, W.L. 1917. Transmission of pneumonic and septicemic plague among marmots. J. Infect. Dis. 20:170-179.

42. Elberg, S.S.; Henderson, D.W. 1948. Respiratory pathogenicity of brucella. J. Infect. Dis. 82:302-306.

43. Faber, H.K.; Silverberg, R.J.; Dong, L. 1950. Studies on the entry and egress of poliomyelitic infection: I. Neutrotropic infection of the peripheral ganglia in apparently healthy monkeys following casual exposure. J. Exp. Med. 91:417-424.

44. Fabricant, J.; Levine, P.P. 1962. Experimental production of complicated chronic respiratory disease infection ("Air-Sac" disease). Avian Dis. 6:13-23.

45. Fahey, J.E.; Crawley, J.F. 1955. Studies on chronic respiratory disease of chickens. V. Air-borne spread of the CRD agents. Can. J. Comp. Med. Vet. Med. 19:53-56.

46. Fellowes, O.N.; Dimopoulos, G.T. 1957. Isolation of vesicular stomatitis virus from mouse mothers after inoculation of suckling mouse litters. J. Bacteriol. 73:444-445.

47. Felsenfeld, O.; Young, V.M.; Loeffler, E.; Ishihara, S.J.; Schroeder, W.F. 1951. A study of brucellosis in chickens. Amer. J. Vet. Res. 12:48-54.

48. Fenner, F. 1947. Studies in infectious ectromelia in mice. II. Natural transmission: The portal of entry of the virus. Australian J. Exp. Biol. Med. Sci. 25:275-282.

49. Fenner, F. 1947. Studies in infectious ectromelia in mice (Mouse pox). III. Natural transmission: Elimination of the virus. Australian J. Exp. Biol. Med. Sci. 25:327-335.

50. Fenner, F. 1949. Mouse-pox (infectious ectromelia of mice): A review. J. Immunol. 63:341-373.

51. Fogedby, E.G.; Malmquist, W.A.; Osteen, O.L.; Johnson, M.L. 1960. Air-borne transmission of foot-and-mouth disease virus. Nord. Vet. Med. 12:490-498.

52. Gillespie, J.H.; Baker, J.A. 1952. Experimental Q fever in cats. Amer. J. Vet. Res. 13:91-94.

53. Goodman, N. 1965. Environmental studies of Histoplasma capsulatum. Doctoral thesis. University of Oklahoma, Norman, Oklahoma.

54. Gorham, J.R.; Leader, R.W.; Padgett, G.A.; Burger, D.; Henson, J.B. 1965. Some observations on the natural occurrence of Aleutian disease, p. 279-285. In D. Carleton Gajdusek, Clarence J. Gibbs, Jr., and Michael Alpers (ed.) Slow, latent, and temperate virus infections. Nat. Inst. Neurol. Dis. Blindness Monogr. 2. Bethesda, Maryland.

55. Gray, D.F.; Mattinson, M.W. 1952. Detection of small numbers of tubercle bacilli from dispersed cultures, using mice, guinea pigs, and artificial media. Amer. Rev. Tuberc. 65:572-588.

56. Griesemer, R.A. 1968. Progress report, Contract PH 43-65-1001. National Institutes of Health, Bethesda, Maryland.

57. Hahon, N.; McGavran, M.H. 1961. Air-borne infectivity of the variola-vaccinia group of pox-viruses for the cynomolgus monkey, Macaca irus. J. Infect. Dis. 109:294-298.

58. Hall, W.J.; Bean, C.W.; Pollard, M. 1941. Transmission of fowl leucosis through chick embryos and young chicks. Amer. J. Vet. Res. 2:272-279.

59. Hartley, J.W.; Rowe, W.P. 1960. A new mouse virus apparently related to the adenovirus group. Virology 11:645-647.

60. Henderson, D.W.; Peacock, S.; Randles, W.J. 1967. On the pathogenesis of Semliki Forest virus (SFV) infection in the hamster. Brit. J. Exp. Pathol. 48:228-234.

61. Heuschele, W.P. 1967. Studies on the pathogenesis of African swine fever. I. Quantitative studies on the sequential development of virus in pig tissues. Arch. Ges. Virusforsch. 21:349-356.

62. Willaert, E.L.; Hutchings, L.M.; Andrews, F.N. 1950. Brucellosis in male guinea pigs. Amer. J. Vet. Res. 11:84-88.

63. Hinton, A.; Larsh, H.W.; Silberg, S.L. 1957. Direct exposure of mice to soils known to contain Histoplasma capsulatum. Proc. Soc. Exp. Biol. Med. 94:176-179.

64. Hoerlein, A.B. 1952. Studies in swine brucellosis: I. The pathogenesis of artificial Brucella melitensis infection. Amer. J. Vet. Res. 13:67-73.

65. Holden, P. 1955. Transmission of eastern equine encephalomyelitis among ring-necked pheasants. Proc. Soc. Exp. Biol. Med. 88:607-610.

66. Hore, D.E.; Stevenson, R.G. 1967. Experimental virus pneumonia in lambs. Vet. Rec. 80:26-27.

67. Horsfall, F.L.; Curnen, E.C. 1946. Studies on pneumonia virus of mice (PVM). II. Immunological evidence of latent infection with the virus in numerous mammalian species. J. Exp. Med. 83:43-64.

68. Howe, H.A.; Bodian, D. 1944. Poliomyelitis by accidental contagion in the chimpanzee. J. Exp. Med. 80:383-390.

69. Hugenholtz, P.G.; Reed, R.E.; Maddy, K.T.; Troutman, R.J.; Barger, J.D. 1958. Experimental coccidioidomycosis in dogs. Amer. J. Vet. Res. 19:433-439.

70. Huygelen, C.; Peetermans, J. 1967. Attenuation of rubella virus by serial passage in primary rabbit kidney cell cultures. II. Experiments in animals. Arch. Ges. Virusforsch. 21:357-365.

71. Jacobson, H.P. 1928. Coccidioidal granuloma. Calif. Western Med. 29:392-396.

72. Jennings, L.F.; Rumpf, R.M. 1965. Control of epizootic diarrhea in infant mice. Lab. Animal Care 15:386-391.

73. Jerstad, A.C. 1967. Transmission of Mycoplasma gallisepticum in turkeys. Avian Dis. 11:546-555.

74. Johnson, K.M. 1965. Epidemiology of Machupo virus infection: III. Significance of virological observations in man and animals. Amer. J. Trop. Med. Hyg. 14:816-818.

75. Johnson, K.M.; Halstead, S.B.; Cohen, S.N. 1967. Hemorrhagic fevers of Southeast Asia and South America: A comparative appraisal. Progr. Med. Virol. 9:105-158.

76. Karstad, L.; Hanson, R.P. 1959. Natural and experimental infections in swine with the virus of eastern encephalitis. J. Infect. Dis. 105:293-296.

77. Katzin, D.S.; Connor, J.D.; Wilson, L.A.; Sexton, R.S. 1967. Experimental herpes simplex infection in the owl monkey. Proc. Soc. Exp. Biol. Med. 125.391-398.

78. Kirchheimer, W.F.; Jemski, J.V.; Phillips, G.B. 1961. Cross-infection among experimental animals by organisms infectious for man. Proc. Animal Care Panel 11:83-92.

79. Kissling, R.E.; Chamberlain, R.W.; Nelson, D.B.; Stamm, D.D. 1956. Venezuelan equine encephalomyelitis in horses. Amer. J. Hyg. 63:274-287.

80. Korobkova, E.I.; Shmerkevich, D.L.; Samoilova, L.V. 1967. Guinea pig and albino mouse sensitivity to plague in contact infection. Zh. Mikrobiol. Epidemiol. i Immunobiol. 44:93-98.

81. Kraft, L.M. 1957. Studies on etiology and transmission of epidemic diarrhea of infant mice. J. Exp. Med. 106:743-755.

82. Kruse, R.H.; Green, T.D.; Leeder, W.D. 1967. Infection of control monkeys with Coccidioides immitis by caging with inoculated monkeys, p. 387-395. In L. Ajello (ed.) Coccidioidomycosis. Univ. of Arizona Press, Tucson, Arizona.

83. Kulagin, S.M.; Fedorova, N.I.; Ketiladze, E.S. 1962. Laboratory outbreak of hemorrhagic fever with a renal syndrome: Clinico-epidemiological characteristics. Zh. Mikrobiol. Epidemiol. i Immunobiol. 33:10:121-126.

84. Lancaster, J.E.; Goswami, J.N.; Rienzi, A.A. 1960. Observations of the spread of pleuropneumonia-like organisms of chickens. Can. J. Comp. Med. Vet. Sci. 24:10-16.

85. Marsh, H.W. 1960. Natural and experimental epidemiology of histoplasmosis. Ann. N.Y. Acad. Sci. 89:78-90.

86. Law, L.W. 1965. Studies of experimental transmission of leukemogenic virus infection in mice. J. Nat. Cancer Inst. 34:543-549.

87. Law, L.W. 1966. Transmission studies of a leukemogenic virus, MLV, in mice, p. 267-285. In Marvin A. Rich and John B. Moloney (ed.). Conference on murine leukemia. Nat. Cancer Inst. Monogr. 22, Bethesda, Maryland.

88. Law, L.W.; Moloney, J.B. 1961. Studies of congenital transmission of a leukemia virus in mice. Proc. Soc. E p. Biol. Med. 108:715-723.

89. Lennette, E.H.; Holmes, M.A.; Abinanti, F.R. 1952. Q fever studies: XIV. Observations on the pathogenesis of the experimental infection induced in sheep by the intravenous route. Amer. J. Hyg. 55:254-267.

90. Lewis, A.M.; Rowe, W.P.; Turner, H.C.; Huebner, R.J. 1965. Lymphocytic choriomeningitis virus in hamster tumor: Spread to hamsters and humans. Science 150:363-364.

91. Liess, B.; Plowright, W. 1964. Studies on the pathogenesis of rinderpest in experimental cattle: I. Correlation of clinical signs, viremia and virus excretion by various routes. J. Hyg. 62:81-100.

92. Lurie, M.B. 1952. Experimental epidemiology of tuberculosis: The prevention of natural air-borne contagion of tuberculosis in rabbits by ultraviolet irradiation. Amer. Rev. Tuberc. 65:559-572.

93. Marchette, N.J.; Lungren, D.L.; Nicholes, P.S.; Vest, E.D. 1961. Studies on infectious diseases in wild animals in Utah: I. Susceptibility of wild mammals to experimental tularemia. Zoonoses Res. 1:49-73.

94. McDaniel, L.S.; McDaniel, I.N.; Chute, H.L. 1962. Laboratory transmission of Rous sarcoma virus by Aedes aegypti. Avian Dis. 6:127-132.

95. Meyer, H.M., Jr.; Hopps, H.E.; Rogers, N.G.; Brooks, B.E.; Bernheim, B.C.; Jones, W.P.; Nisalak, A.; Douglas, R.D. 1962. Studies on simian virus 40. J. Immunol. 88:796-806.

96. Meyer, K.F. 1957. The natural history of plague and psittacosis. Public Health Rep. 72:705-719.

97. Meyer, K.F.; Larson, A. 1960. The pathogenesis of cervical septicemic plague developing after exposure to pneumonic plague produced by intratracheal infection in primates, p. 1-12. In Symposium proceedings, Haffkine Institute Diamond Jubilee, 1959. New Jack Printing Works Pvt. Ltd., Bombay, India.

98. Miller, B.R.; Miller, R.E. 1950. Distribution of Newcastle disease virus in, and elimination from, intratracheally and intramuscularly inoculated birds. J. Amer. Vet. Med. Ass. 117:229-233.

99. Miller, W.S. 1966. Susceptibility of White Carneau pigeons to respiratory infection by Venezuelan equine encephalitis virus. Amer. J. Epidemiol. 83:48-53.

100. Miller, W.S. 1966. Studies on the response of White Carneau pigeons to respiratory and subcutaneous doses of Venezuelan equine encephalitis virus. Amer. J. Epidemiol. 84:181-192.

101. Miller, W.S. 1966. Infection of pigeons by airborne Venezuelan equine encephalitis virus. Bacteriol. Rev. 30:589-595.

102. Miller, W.S.; Demchak, P.; Rosenberger, C.R.; Dominik, J.W.; Bradshaw, J.L. 1963. Stability and infectivity of airborne yellow fever and Rift Valley fever viruses. Amer. J. Hyg. 77:114-121.

103. Minette, H.P.; Shaffer, M.F. 1968. Experimental leptospirosis in monkeys. Amer. J. Trop. Med. Hyg. 17:202-212.

104. Mirand, E.A. 1967. Transmission of some tumor viruses, p. 269-285. In Gerald Berg (ed.) Transmission of viruses by the water route. Interscience Publishers, New York, N.Y.

105. Morris, J.A.; Gajdusek, D.C.; Gibbs, C.J., Jr. 1965. Spread of scrapie from inoculated to uninoculated mice. Proc. Soc. Exp. Biol. Med. 120:108-110.

106. Nelson, J.B. 1952. Acute hepatitis associated with mouse leukemia: I. Pathological features and transmission of the disease. J. Exp. Med. 96:293-302.

107. Nelson, J.B. 1957. The etiology and control of chronic respiratory disease in the rat. Proc. Animal Care Panel 7:30-40.

108. Nelson, J.B. 1967. Pathologic response of Swiss and Princeton mice to M. pulmonis. Ann. N.Y. Acad. Sci. 143:778-783.

109. Noble, J.; Rich, J.A. 1968. Smallpox: Transmission by contact and aerosol route in Cynomolgus irus monkeys. Bacteriol. Rev. p. 182-183.

110. Notkins, A.L.; Scheele, C. 1963. Studies on the transmission and the excretion of the lactic dehydrogenase agent. J. Exp. Med. 118:7-12.

111. Notkins, A.L.; Scheele, C.; Scherp, H.W. 1964. Transmission of the lactic dehydrogenase agent in normal and partially edentulous mice. Nature 202:418-419.

112. Olesiuk, O.M.; Van Roekel, H. 1960. Transmission of chronic respiratory disease in chickens. Avian Dis. 4:348-368.

113. Olesiuk, O.M.; Van Roekel, H.; Roberts, D.H. 1967. Transmission and eradication of Mycoplasma gallisepticum in chickens. Poultry Sci. 46:578-599.

114. Owen, C.R.; Buker, E.O. 1956. Factors involved in the transmission of Pasteurella tularensis from inoculated animals to healthy cagemates. J. Infect. Dis. 99:227-233.

115. Oxford, J.S. 1967. The growth of rubella virus in small laboratory animals. J. Immunol. 98:697-701.

116. Page, L.A. 1959. Experimental ornithosis in turkeys. Avian Dis. 3:51-66.

117. Parker, J.C.; Reynolds, R.K. 1968. Natural history of Sendai virus infection in mice. Amer. J. Epidemiol. 88:112-125.

118. Parker, J.C.; Tennant, R.W.; Ward, T.G. 1966. Prevalence of viruses in mouse colonies, p. 25-36. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

119. Parkman, P.D.; Phillips, P.E.; Kirschstein, R.L.; Meyer, H.M., Jr. 1965. Experimental rubella virus infection in the rhesus monkey. J. Immunol. 95:743-752.

120. Phillips, G.B.; Jemski, J.V.; Brant, H.G. 1956. Cross-infection among animals challenged with Bacillus anthracis. J. Infect. Dis. 99:222-226.

121. Phillips, G.B.; Broadwater, G.C.; Reitman, M.; Alg, R.L. 1956. Cross infections among brucella-infected guinea pigs. J. Infect. Dis. 99:56-59.

122. Porwit-Bobr, Z.; Ptak, W.; Garlacz, A. 1967. Specific complement-fixing antibodies against polyoma tumour antigens and viral haemagglutination inhibiting antibodies in hamsters infected with polyoma virus. Acta Virol. 11:357-362.

123. Potkay, S.; Ganaway, J.R.; Rogers, N.; Kinard, R. 1966. An epizootic of measles in a colony of rhesus monkeys (Macaca mulatta). Amer. J. Vet. Res. 27:331-334.

124. Povey, R.C.; Johnson, R.H. 1967. Further observations on feline viral rhinotracheitis. Vet. Rec. 81:686-689.

125. Prior, J A.; Cole, C.R. 1951. Studies on the communicability of histoplasmosis. Amer. Rev. Tuberc. 23:538-546.

126. Rosebury, T. 1947. Experimental air-borne infection. The Williams & Wilkins Company, Baltimore, Maryland.

127. Rosenthal, S.R.; Elmore, F.H. 1950. Studies on the contagiousness of coccidioidomycosis. Amer. Rev. Tuberc. 61:106-115.

128. Rowe, W.P. 1961. The epidemiology of mouse polyoma virus infection. Bacteriol. Rev. 25:18-31.

129. Rowe, W.P.; Hartley, J.W.; Capps, W.I. 1963. Mouse hepatitis virus infection as a highly contagious, prevalent infection of mice. Proc. Soc. Exp. Biol. Med. 112:161-165.

130. Sanmartin-Barberi, C.; Groot, H.; Osorno-Mesa, E. 1954. Human epidemic in Colombia caused by Venezuelan equine encephalomyelitis virus. Amer. J. Trop. Med. Hyg. 3:283-293.

131. Saslaw, S.; Carlisle, H.N. 1966. Aerosol infection of monkeys with Rickettsia rickettsi. Bacteriol. Rev. 30:636-644.

132. Saslaw, S.; Carlisle, H.N.; Wolf, G.L.; Cole, C.R. 1966. Rocky Mountain spotted fever: Clinical and laboratory observations of monkeys after respiratory exposure. J. Infect. Dis. 116:243-255.

133. Satriano, S.F.; Luginbuhl, R.E.; Wallis, R.C.; Jungherr, E.L.; Williamson, L.A. 1958. Investigation of eastern equine encephalomyelitis: IV. Susceptibility and transmission studies with virus of pheasant origin. Amer. J. Hyg. 67:21-34.

134. Sauer, R.M.; Prier, J.E.; Buchanan, R.S.; Creamer, A.A.; Fegley, H.C. 1960. Studies on a pox disease of monkeys. I. Pathology. Amer. J. Vet. Res. 21:377-380.

135. Schmidt, L.H. 1956. Some observations on the unity of simian pulmonary tuberculosis in defining the therapeutic potentialities of isoniazid. Suppl. No. 2, Part 2, Proc. Symp. Tuberculosis in Infancy and Childhood. Amer. Rev. Tuberc. Pulmonary Dis. 74:138-159.

136. Schneider, H.A.; Collins, G.R. 1966. Successful prevention of infantile diarrhea of mice during an epizootic by means of a new filter cage unopened from birth to weaning. Lab. Animal Care 16:60-71.

137. Schulman, J.L.; Kilbourne, E.D. 1962. Airborne transmission of influenza virus infection in mice. Nature 193:1129-1130.

138. Schulman, J.L.; Kilbourne, E.D. 1963. Experimental transmission of influenza virus infection in mice: I. The period of transmissibility. J. Exp. Med. 118:257-275.

139. Schwarte, L.H.; Mathews, J. 1954. Aerosol properties of lyophilized hog cholera virus. Vet. Med. 49:233-234.

140. Scott, G.R.; Rampton, C.S. 1961. Transmission of lapinized rinderpest virus by contact between rabbits. Nature 192:289.

141. Sevoian, M.; Chamberlain, D.M.; Larose, R.N. 1963. Avian lymphomatosis: V. Air-borne transmission. Avian Dis. 7:102-105.

142. Shahan, M.S.; Frank, A.H.; Mott, L.O. 1946. Studies of vesicular stomatitis with special reference to a virus of swine origin. J. Amer. Vet. Med. Ass. 108:5-19.

143. Shope, R.E. 1935. Experiments in the epidemiology of pseudorabies. J. Exp. Med. 62:85-117.

144. Sinha, S.K.; Hanson, R.P.; Brandly, C.A. 1954. Aerosol transmission of Newcastle disease in chickens. Amer. J. Vet. Res. 15:287-292.

145. Skinner, H.H. 1957. The virus of vesicular stomatitis in small experimental hosts: I. White mice, cotton rats, chick embryos and young chickens. J. Comp. Pathol. Therap. 67:69-86.

146. Smith, C.E.; Pappagianis, D.; Saito, M.T. 1957. The public health significance of coccidioidomycosis, p. 3-9. In Proceedings of Symposium on Coccidioidomycosis. Public Health Serv. Publ. 575.

147. Smith, W.; Andrewes, C.H.; Stuart-Harris, C.H. 1938. A study of epidemic influenza with special reference to the 1936-7 epidemic. Studies on immunization of ferrets and mice. Med. Res. Council (Brit.) Special Rep. Series No. 228:125-127.

148. Spalatin, J.; Connell, R.; Burton, A.N.; Gollop, B.J. 1964. Western equine encephalitis in Saskatchewan reptiles and amphibians, 1961-1963. Can. J. Comp. Med. Vet. Sci. 28:131-142.

149. Stanley, N.F.; Leak, P.J.; Walters, M.N.I.; Joske, R.A. 1964. Murine infection with reovirus: II. The chronic disease following reovirus type 3 infection. Brit. J. Exp. Pathol. 45:142-149.

150. Stubbs, E.L.; Furth, J. 1931. Transmission experiments with leucosis of fowls. J. Exp. Med. 53:269.

151. Sullivan, J.F.; Songer, J.R. 1966. Role of differential air pressure zones in the control of aerosols in a large animals isolation facility. Appl. Microbiol. 14:674-678.

152. Taber, L.E.; Hogge, A.L., Jr.; McKinney, R.W. 1965. Experimental infection of dogs with two strains of Venezuelan equine encephalomyelitis virus. Amer. J. Trop. Med. Hyg. 14:647-651.

153. Tennant, R.W.; Parker, J.C.; Ward, T.G. 1966. Respiratory virus infections of mice, p. 93-104. In Robert Holdenried (ed.) Viruses of laboratory rodents. Nat. Cancer Inst. Monogr. 20. Bethesda, Maryland.

154. Theiler, M.; Gard, S. 1940. Encephalomyelitis of mice. I. Characteristics and pathogenesis of the virus. J. Exp. Med. 72:49-67.

155. Theiler, M.; Gard, S. 1940. Encephalomyelitis of mice. III. Epidemiology. J. Exp. Med. 72:79-90.

156. Thorpe, B.D.; Marchette, N.J.; Bushman, J.B. 1963. Virulence studies of Pasteurella pestis isolated from the Great Salt Lake desert. Amer. J. Trop. Med. Hyg. 12:219-222.

157. Traub, E. 1936. The epidemiology of lymphocytic choriomeningitis in white mice. J. Exp. Med. 64:183-200.

158. Traub, E. 1939. Epidemiology of lymphocytic choriomeningitis in a mouse stock observed for four years. J. Exp. Med. 69:801-817.

159. Traub, E.; Kesting, F. 1956. Ueber die Ausscheidung des E.E.E.-Virus und das gelegentliche Vorkommen von Kontaktinfektionen bestimmter Art bei Mausen. Zentralbl. Bakteriol. Parasitenk. Abt. I. Orig. 166:462-475.

160. Tyushnyakova, M.K.; Zagromova, M.S. 1960. Data obtained in an investigation of lymphocytic choriomeningitis in Tomskaya Oblast, p. 31-39. 11th Transactions of the Tomsk Scientific Research Institute of Vaccines and Serums. Translation by Foreign Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.

161. Von Magnus, P.; Anderson, E.K.; Petersen, K.B.; Birch-Anderson, A. 1959. A pox-like disease in cynomolgus monkeys. Acta Pathol. Microbiol. Scand. 46:156-176.

162. Wenner, H.A.; Macasaet, F.D.; Kamitsuka, P.S.; Kidd, P. 1968. Monkey pox. I. Clinical, virologic, and immunologic studies. Amer. J. Epidemiol. 87:551-566.

163. Westwood, J.C.N.; Boulter, E.A.; Bowen, E.T.W.; Maber, H.B. 1966. Experimental respiratory infection with poxviruses: I. Clinical virological and epidemiological studies. Brit. J. Exp. Pathol. 47:453-465.

164. Williams, F.P.; Whitney, R.A.; Ferrell, J.F. 1967. The microbial status of the respiratory tract in conventional sustained barrier and axenic rat colonies. 18th Ann. Meeting Amer. Ass. Lab. Animal Sci. Abst. No. 31.

165. Yamamoto, R. 1967. Localization and egg transmission of Mycoplasma meleagridis in turkeys exposed by various routes. Ann. N.Y. Acad. Sci. 143:225-233.

166. Yamamoto, R.; Clark, G.T. 1966. Streptobacillus moniliformis infection in turkeys. Vet. Rec. 79:95-100.

167. Zarafonetis, C.; Sulkin, S.E.; Terry, C.H. 1947. Poliomyelitis (Lansing) contact infection in mice. J. Bacteriol. 53:367.

168. Zlotnik, I.; Rennie, J.C. 1967. The effect of heat on the scrapie agent in mouse brain. Brit. J. Exp. Pathol. 48:171-179.

169. Zwart, D.; Macadam, I. 1967. Transmission of rinderpest by contact from cattle to sheep and goats. Res. Vet. Sci. 8:37-47.

TABLE 5. ASSESSMENT OF RISK OF HUMAN INFECTION IN THE MICROBIOLOGICAL LABORATORY

A Comparative Review of Four Indicators of Risk

Causative Agent or Disease	Number of Reported Laboratory-Acquired Human Infections[a/] and Deaths[b/]	Infection of Control Animals[a/] by Animals Inoculated Other than by Oral or Respiratory Challenge[b/]	Reported Presence of the Inoculated Microorganism in Urine and/or Feces of the Inoculated Animals[a/]	Effective Vaccine, Toxoid, or Drug Therapy for Man
Absettarov virus	1			
Actinomycosis	3			?
Adenovirus	8	+	+	yes
African swine fever	none		+	
Aleutian disease	none	+	+	
Amebiasis	20			yes
Anthrax	36 (3)	0	+	yes
Apeu virus	1	0		
Avian lymphomatosis	1	+[d/]	+	
Bebaru virus	1			
Bittner agent	none		0	
Blastomycosis	8			?
Botulinum toxin	none	0[g/]	+	yes
Brucellosis	274 (2)	+	+	?
Bunyamwera	6			
Candidiasis	2			?
Caraparu virus	none	0		
Chikungunya virus	19			?
Cholera	9		+	yes
Coccidioidomycosis	108 (1)	0	+	?
Colorado tick fever	8			
Coxsackie virus	35		+	
Cryptococcosis	none		+	?
Cytomegalic inclusion disease	none		+	
Dengue	6		0[i/]	
Dermatophytoses	84			?
Diphtheria	40			yes
Distemper	none		0	
Eastern equine encephalitis	2	+	+	yes
ECHO virus	1		+	
Encephalomyocarditis	none		+	
Enterovirus			+	
Epidemic diarrhea of infant mice	none	+[j/]	+[k/]	
Erysepelothrix	32		+	
Foot-and-mouth disease	2	+	+	
Friend's virus	none	0	+	
Ganjam virus	2			
Germiston virus	3			
Glanders	14		+	yes
Gonorrhea	4			yes
Hemophilus influenzae	7			?
Hepatitis, infectious	126 (1)		+	
Herpes simplex virus	none	+	+	
Histoplasmosis	81	+[j/]	+	?
Hog cholera	none			
Hypr virus	4			
Ilheus virus	1			
Infectious bronchitis, avian	none	+[j/]		
Influenza virus	7	+	+	yes
Itaqui virus	none	0		
Japanese B encephalitis	2	0	+	yes
Junin virus	5 (1)	+	+	
Y virus	none		+	
Kemerovo virus	*			
Kunjin virus	2			
Kyasanur Forest disease	65			
Lactic dehydrogenase agent	none	+	+	
Leishmaniasis	4			
Lethal intestinal virus of infant mice	none			
Leptospirosis	45 (6)	0	+	
Louping ill	2	+		
Lymphocytic choriomeningitis	19 (2)	+	+	
Lymphogranuloma venereum	6			yes

Causative Agent or Disease	Number of Reported Laboratory-Acquired Human Infections and Deaths[a]	Infection of Control Animals by Animals Inoculated Other than by Oral or Respiratory Challenge[b]	Reported Presence of the Inoculated Microorganism in Urine and/or Feces of the Inoculated Animals[c]	Effective Vaccine, Toxoid, or Drug Therapy for Man
Machupo virus	4 (1)	+	+	
Malaria	13			yes
Mammary tumor	none		0	
Marek's disease	none	+[d]	+	
Marituba virus	1	0		
Mayaro virus	3			
Measles	1	+[i]	+[i]	yes
Melioidosis	none	+[n]	+	yes
Meningopneumonitis of mice	none			
Meningococcus	5			yes
Moloney leukemogenic virus	none	0	+[i]	
Monkey B virus	11 (9)	+	0	
Monkey pox	none	+		
Mouse hepatitis	none	+	+	
Mouse pox	none	+	+	
Mucambo virus	2			
Murutucu	none	0		
Mumps	3		+[i]	yes
Mycoplasma (PPLO)	1	+	+[i]	
Nairobi sheep disease	1			
Negishi virus	*			
Newcastle virus	32	+[d]	+	
Nocardiosis	1			
Omsk hemorrhagic fever	3			
Oriboca virus	1	0		
Oropouche virus	2			
Ovine dermatitis	5			
Parainfluenza 5, DA	none		+	
Pasteurella leptiseptica	*			
Piry virus	5			
Plague	4 (1)	+	+	yes
Pneumococcus	4			yes
Pneumonia virus of mice	none	+[i]		
Poliomyelitis	9 (2)	+[g]	+	yes
Polyoma virus	none	+	+	
Powassan virus	1			
Pseudorabies (Aujeszky's disease)	1	+[m]	0	
Psittacosis-ornithosis	70 (7)	+[d]	+	yes
Q fever	184 (1)	+[g]	+	yes
Rabbit pox	none	+[r]		
Rabies	none		+[h]	yes
Rat bite fever	14			
Rauscher virus	none			
Relapsing fever	16			
Reovirus	7	+[r]	+	
Rhinotracheitis	none			
Rhinovirus	none		+	
Rickettsial pox	6			yes
Rift Valley fever	24 (1)	0	0	yes
Rinderpest	none	+	+	
Rio Bravo virus	5			
Rocky Mountain spotted fever	23 (1)	0		yes
Ross River virus	2			
Rous sarcoma	none	+[d]		
Rubella	none	+	+	yes
Russian Far East encephalitis	*			
Russian spring-summer encephalitis	5 (2)	+[n]	+	
St. Louis encephalitis	1	0	0	
Salmonellosis	54		+	yes
Sarcoma (SV-40) virus	none		+	
Scrapie	none	+		
Semliki Forest virus	1		0	
Sendai virus	none	+[i]	+	

Causative Agent or Disease	Number of Reported Laboratory-Acquired Human Infections[o] and Deaths[p]	Infection of Control Animals[a] by Animals Inoculated Other than by Oral or Respiratory Challenge[b]	Reported Presence of the Inoculated Microorganism in Urine and/or Feces of the Inoculated Animals[c]	Effective Vaccine, Toxoid, or Drug Therapy for Man
Serratia marcescens	4		+	
Shigellosis	54 (1)		+	yes
Smallpox	1		+	yes
Soviet hemorrhagic fevers	113	+[i]	+	
Spondweni virus	2			
Sporotrichosis	7			yes
Staphylococcal enterotoxin	none		+	
Staphylococcus	19 (1)			yes
Streptococcus	67 (3)			yes
Swine pox	none		0	
Teschen disease	none		+	
Tetanus	6			yes
Theiler's virus	none	+[s]	+	
Toxoplasmosis	21 (1)			
Trachoma	5			
Treponema pallidum	10			yes
Trypanosomiasis	5			
Tsutsugamushi (scrub typhus)	12		0	yes
Tuberculosis	174 (5)	+	+	yes
Tularemia	129 (1)	+[f]	+	yes
Typhoid fever	292 (21)		+	yes
Typhus (endemic)	82 (4)		+	yes
Typhus (epidemic)			0	yes
Vaccinia	9	+	+	yes
Venezuelan equine encephalitis	118 (1)	+	+	yes
Vesicular stomatitis	54	+		
Vibrio fetus	1			
Viral pneumonia (atypical)	*			
Wesselsbron virus	4			
Western equine encephalitis	6 (2)	+[d]	+[d]	?
West Nile virus	13			
Yaba virus	none			
Yellow fever	38 (6)	0	0	yes
Zika virus	1			

* = Reference does not specify details or how many cases.
0 = Negative in all animals tested.
+ = Positive in some species by at least one method of inoculation, but not necessarily in all species tested.
a = Uninoculated animals caged with or near inoculated animals. See Table 4 for more details.
b = Respiratory challenge - aerosol exposure, intratracheal inoculation, intranasal instillation.
c = See Table 3.
d = Only avian species were +.
e = Cat only; not in guinea pig, hamster, or monkey.
f = Mice only, rare and irregular; other species 0. See Table 4.
g = Method of inoculation not precisely stated.
h = Man only; not in hamsters or mice.
i = Man only; no other species tested.
j = Milk of parenterally inoculated mothers had transmitted the virus to these otherwise uninoculated mice.
k = After oral inoculation.
l = Only naturally infected animals caged with normals.
m = Swine only; not in rabbits, white rats, mice, or guinea pigs.
n = Infection due to cannibalism.
o = See Table 1.
p = Number in parentheses refers to deaths.
q = Only one mouse infected among 59 control cagemates.
r = Control animals placed in cage or pen with animals infected by contact transmission.
s = Murine mother inoculated; litter test animal infected.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)

Department of the Army
Fort Detrick, Frederick, Maryland, 21701

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b. GROUP

3. REPORT TITLE

ASSESSMENT OF RISK OF HUMAN INFECTION IN THE MICROBIOLOGICAL LABORATORY
Second Edition

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

Arnold G. Wedum
Richard H. Kruse

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1969	89	700

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. None	Miscellaneous Publication 30
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT
Distribution of this publication is unlimited; it has been cleared for release to the general public. Non-DOD agencies may purchase this publication from Clearinghouse, ATTN: Storage and Dissemination Section, Springfield, Virginia, 22151.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Department of the Army Fort Detrick, Frederick, Maryland, 21701

13. ABSTRACT

In estimating the risk of human infection during research in the microbiological laboratory and in deciding upon appropriate safeguards, it is useful to know the nature of the work in terms of (i) potential accidental microbial aerosol formation and accidental injection, ingestion, cut, and bite; (ii) the number of recorded laboratory infections and their outcome; (iii) the medical prophylactic procedures available; (iv) whether the microorganism is excreted in urine and feces; and (v) whether inoculated animals infect normal cagemate control animals. Detailed tabular summaries with 700 references and working assumptions pertinent to these matters are presented for 162 causative agents or diseases.

14. Key Words

*Bibliographies
*Biological laboratories
*Laboratory infections
*Safety
Biological aerosols
Cages
Contamination
Cross infection
Exposure
ID_{50} (Median infective dose)
Laboratory animals
Prophylaxis

DD FORM 1 NOV 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification